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ON

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(PUBLISHED QUARTERLY.)

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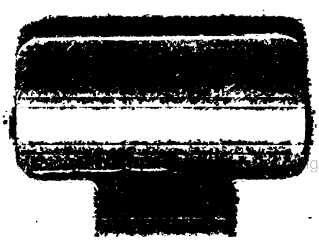

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(PUBLISHED QUARTERLY.)

EDITED UNDER THE PROVISIONS OF ACTS OF 1909, CHAPTER 504, SECTION 6

BY

WALTER E. FERNALD, M.D.
GEO. M. KLINE, M.D.
E. E. SOUTHARD, M.D.

BOSTON:
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SELECTED MEDICAL AND SCIENTIFIC STUDIES.

REPORT ON THE CLINICAL SYMPTOMATOLOGY AND LABORATORY FINDINGS IN THREE CASES OF GENERAL PARESIS UNDER INTRAVENOUS ARSENOBENZOL TREATMENT.*

By G. E. Mott, M.D., and S. M. Bunker, M.D., Worcester, Mass.,

assistant physicians, worcester state hospital, worcester, mass.

The recent increase of literature on the subject of syphilis and its action upon the nervous system, together with the results obtained from the intensive treatment of salvarsan now being practiced in our State hospitals for the insane and at a number of the larger general hospitals, suggests that a brief presentation of the history, symptomatology and laboratory findings in three cases here under treatment for the past three months will be of interest at this meeting of the Worcester District Medical Society.

Most of the cases of central neural syphilis in this State are classified as general paresis. The percentage of admissions of this disease to our State hospitals for Massachusetts has been given at 9 per cent.

Hitherto the diagnosis of general paresis has been made upon the appearance of such classical symptoms as the Argyll-Robertson pupil, altered knee jerks, ataxia, loss of judgment, emotional instability, etc. The diagnosis was confirmed by the well-known Wassermann reactions in the blood and spinal fluid.

We have come to look for the following six laboratory tests in confirmation of the diagnosis of general paresis: —

1. Positive colloidal gold reaction of Lange (gold chloride test).
2. Globulin — present and increased, Noguchi — butyric acid method.
3. Albumen — present and increased.
4. Number of lymphocytes per centimeter increased from 10 to 400.
5. Wassermann reaction in blood serum.
6. Wassermann reaction in spinal fluid.

* Read before the Worcester District Medical Society on March 8, 1916.

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It is interesting to note, that practically nothing is known of the reactions of the spinal fluid prior to the onset of the clinical symptoms of general paresis. Recent work by Southard and other observers, however, tends to show that the six positive laboratory findings for general paresis are present months, and perhaps years, before the appearance of the classical clinical symptoms. With these findings in view, spinal punctures, as well as the regular blood serum tests, are fast becoming routine procedure.

Moore, in his translation of Kraepelin's discussion of general paresis in the last edition of his textbook states: —

> The actual beginning of paresis consists, as a rule, of rather indefinite symptoms which are usually interpreted as nervousness. They are apt to be excitability, a hasty, irritable, whining manner, anxiety states, absent-mindedness, fatigability, mental dulness, forgetfulness, a tendency to sleep or persistent sleeplessness. Accompanying these are headaches, migraine with scotomata and vomiting, giddiness, cardiac palpitation, excessive sweating, rheumatoid pains, numb feelings, muscle twitchings, writer's cramp, brief weaknesses, abdominal cramps and intestinal obstruction. In the further course, the mental and physical symptoms may progress collectively or individually with very irregular rapidity. Thus there are cases in which even severe disturbance of speech and writing, with tabetic signs and lost reflexes, may exist for a long time before any marked involvement of memory or intellect can be discovered. On the other hand, the mental symptoms may be fairly prominent while physical examination reveals at first only indefinite and non-characteristic changes. This fact furnishes a wide opportunity for errors in either direction, before the cytological, and especially the serological, tests afforded us a means of verifying our opinion even in the earliest stage of the disease.

With these points in mind, I will briefly give the chief facts in the histories of three cases of general paresis now under treatment with salvarsan.

This treatment was recommended by the Massachusetts Commission on Mental Diseases. As salvarsan was not on the market, the Canadian preparation, diarsenol, was used until the cheaper price of the Philadelphia Dermatological Laboratory's product, arsenobenzol, made its use advisable.

The drug has been given biweekly, intravenously, in the arms. Following the earlier treatments a distinct reaction occurred, — chills, fever, headache, nausea and vomiting. The most constant symptom was a nervous chill lasting from ten to twenty minutes and appearing from ten to thirty minutes after treatment.

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Some local infiltration and organization has been caused by leaking of drug during administration, but these discomforts have readily yielded to application of ice and massage. Some variability in the acidity of the drug has been noted. Frequent urinalyses have shown only occasional traces of albumen in case of T. H. The body weights have shown scarcely any variation during the past three months.

Case 29742. — G. H. D. Patient is a French Canadian, age thirty-eight, white, single social state, Roman Catholic religion. In the United States thirty years. The family history states that the father died of accident, mother of shock at age of seventy-two, one brother of pulmonary tuberculosis, six sisters living and well.

Personal History. — Early life unimportant. In school eleven years. Employed as a mill hand. Was steady and efficient, well liked, always well and enjoyed a happy disposition. Used alcohol moderately. Never arrested for drinking. Onset of present trouble began about Sept. 17, 1915. Complained about his heart. Returned medicine prescribed by physician to doctor, claiming that the latter had drugged him. Later claimed that his relatives were drugging his food, and for this reason stopped eating. Was hallucinated, talking to himself, saying that he could hear little fairies. Saw them flying around and sitting beside him. Regularly committed to the Worcester State Hospital Oct. 4, 1915. Physician's certificate described him as both excited and depressed at times; as suffering from delusions of persecution. Claimed that members of the Lowell police force had been after him for six weeks; that a medicine with nine hundred and a half grains of poison had been given to him; that he had seen his death certificate signed, and that $500 as a bribe had been offered to somebody to secure his death. Further described as troubled with insomnia. On admission to hospital, interview found him approximately oriented, with well-marked ideas of poisoning, acute auditory and visual hallucinations for the past two weeks. These hallucinations were highly suggestive of alcoholic influence, and this fact, together with the admission that he had been drinking regularly three glasses of beer before, and perhaps from four to seven glasses after, supper daily, led to the diagnosis of alcoholic hallucinosis in a case of general paresis. In addition to the foregoing hallucinations, patient complained that he had a feeling that little fairies were about him — "they feel like little pin pricks" — suggested impairment of tactile sensations. During the earlier part of his residence he was very suspicious in attitude, and seemed apprehensive of some harm coming to him. By degrees his hallucinatory episode abated, his attitude became more sociable and he adjusted himself to his surroundings, although remaining somewhat slovenly in his dress and habits. Following treatment of salvarsan he seemed to improve until February 22, when he flatly refused further treatment. A change in his conduct occurred on February 19, when he began to act peculiarly, — appeared depressed, was noticed kneeling

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about the ward in attitude of prayer, was mute to all questions, and would not co-operate with even such simple procedures as the taking of his temperature.

Physical and Neurological Examination. — The skin showed copper point discolorations, entire body covered with papillomata ranging in size from a pea to a horse chestnut. Glands slightly enlarged in groin, axillary and cervical chain. Mucous membranes pale. Pupils unequal, right larger than left; right does not react well to light. Slight exaggeration of the deep reflexes; coarse, rapid, irregular tremor of extended hands. Percussion note impaired over bases of lungs posteriorly. Slight radial arteriosclerosis; blood pressure 135. Varicose veins, posterior surfaces of both legs. Small linear scar on glans. Urinalysis shows slight trace of albumen. Specific gravity 1.035. No pathological reflexes.

Treatment. — Total arsenic drug equals 4.8 grams.

(*a*) Diarsenol: From Jan. 5, 1916, to Jan. 21, 1916, 6 intravenous injections (alternating arms) of diarsenol, given biweekly in doses varying from 0.3 gram to 0.6 gram, — a total of 2.7 grams of diarsenol.

(*b*) Arsenobenzol: From Feb. 2, 1916, to Feb. 18, 1916, inclusive, four intravenous injections (alternating arms) of American preparation, arsenobenzol, in doses varying from 0.3 to 0.6 gram, — a total of 2.1 grams arsenobenzol.

Patient has steadfastly refused treatment from February 22 to present date. (Repeated punctures on account of small caliber of veins found necessary, causing patient to grow discouraged and irritable. When told of his negative laboratory findings, with idea of encouragement, he decided that he was cured.)

Laboratory Findings. — (*a*) Wassermann Reactions in Blood Sera: From Oct. 13, 1915, to Jan. 25, 1916, inclusive, 6 positive reactions reported by the State Department of Health laboratory. Feb. 7, 1916, negative reaction. Feb. 18, 1916, negative reaction. Feb. 25, 1916, doubtful reaction.

(*b*) Wassermann Reactions in Spinal Fluid: Nov. 10, 1915, positive reaction. Feb. 17, 1916, unsatisfactory reaction.

(*c*) Spinal Fluid Examinations: (1) Gold chloride test. Nov. 8, 1915, 1–1–2–1–±–±–±–0–0–0—positive. Feb. 14, 1916, 3–2–2–±–0–0–0–0–0–0—positive.

(2) Cytological count. Nov. 8, 1915, fresh fluid clear, cells per centimeter equals 125. Feb. 14, 1916, fresh fluid clear, cells per centimeter equals 3.

(3) Albumen test. Nov. 8, 1915, plus, plus, plus. Feb. 14, 1916, plus.

(4) Globulin tests. Nov. 8, 1915, Ross-Jones test plus. Noguchi test plus. Feb. 14, 1916, Ross-Jones test plus. Noguchi test plus.

Case 29578. — A. B. A man aged thirty-six, Italian, in the United States ten years. A waiter by occupation. Successful in business. Committed to the hospital on June 18, 1915. The committing physicians gave the onset of present attack about June 1, 1915, describing the patient as

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suffering from expansive and grandiose ideas (patient said he had about two hundred billion dollars and that he was going to give it to everybody that wanted it; that he was going to build restaurants and feed the poor people). Patient was further described as suffering from insomnia, excitement and talking garrulously. The family history states that one paternal uncle died of tumor of the brain. Patient is said to have been nursed by a woman who later died of syphilitic infection. The personal history credits the patient with little education, describes him as thrifty and saving, drank liquor moderately. Married April, 1914. One child born Jan. 25, 1915. The onset of his present trouble is said to have been sudden, occurring June 1, 1915, when he had some slight trouble with his employer, gave up his job, developed extravagant ideas, was talkative and excited and was sent to the Psychopathic Hospital June 8, 1915.

On admission to this hospital he was noisy, excited, crying, showed loss of emotional control, hoarse from excessive use of voice, had a temperature of 101.2, pulse 90, respiration 20. Admitted contraction of syphilis about twenty years ago at Glasgow, Scot., where he received treatment, every week for a year, of mercury and potassium iodide. The doctor told him that he was cured. Five years later troubled with a sore upon his head; ten years ago, in Boston, a right-sided bubo appeared and was treated surgically. Something over a year ago he desired to get married, and had his blood examined. A positive Wassermann was reported. He therefore took mercurial injections four times a week to the number of 106. The injections were given intramuscularly in the back; all of this treatment is based upon statements of the patient. In his capacity as waiter he claims to have accumulated $12,000. About the middle of May, 1915, patient stated that he experienced a feeling of strange elation, thought that he would like to buy a theatre, and wanted to buy everything to help humanity. Thought that the Boston Psychopathic Hospital was a present to him. During fifteen days he thought that he was boss and undertook to run the place. In his dreams he talked with his father and mother. During the next two months patient was highly excited, engaged in destructive acts, such as tearing his clothing and bedding, digging into the plaster of the walls of his room, taking the springs from his bed to make keys, successfully picked one or two locks, stole spoons and other metal articles to furnish material for his keys. During this period he required frequent sedatives to relieve noisy insomnia. Following this there was an improvement for about a month, followed by a relapse of two months. About Jan. 1, 1916, he was transferred to Gage Hall 2, where he was a great trial to the attendants until he came under the influence of the salvarsan treatment. At the present time he reacts quite naturally to his surroundings and shows a remarkable general, clinical improvement.

A physical and neurological examination at time of admission showed some bruises and discolorations following violent activities preceding admission. General feeling of exaltation, Argyll-Robertson pupils. Irregular, rapid tremor of extended fingers, gelatinous tremor of the tongue

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margin. Some slight pulmonic changes. Blood pressure 150. A slight discoloration at coronal border of the genitals. Urinalysis was negative.

Treatment. — Total arsenic drug equals 9 grams. (*a*) Diarsenol. From Jan. 5, 1916, to Jan. 18, 1916, inclusive, 5 intravenous injections, total, 2.1 grams.

(*b*) Arsenobenzol: From Jan. 21, 1916, to March 7, 1916, inclusive, 12 intravenous injections, total, 6.9 grams.

Laboratory Findings. — (*a*) Wassermann Reactions in Blood Sera: From July 9, 1915, to Feb. 18, 1916, inclusive, 12 positive reactions reported by the State Department of Health Laboratory. Feb. 25, 1916, unsatisfactory reaction. March 4, 1916, position reaction. March 4, 1916, positive reaction.

(*b*) Wassermann Reactions in Spinal Fluid: July 16, 1915, positive reaction. Jan. 27, 1916, positive reaction. March 1, 1916, positive reaction.

(*c*) Spinal Fluid examinations: (1) Gold chloride test. Jan. 24, 1916, 5–5–5–5–5–3–2–1–±–±—positive. Feb. 28, 1916, 5–4–3–4–2–2–0–0–0–0 — positive.

(2) Cytological count, Jan. 24, 1916, fluid too bloody. Feb. 28, 1916, cells per centimeter clear fluid, 3.

(3) Albumen test. Jan. 24, 1916, plus, plus, plus. Feb. 28, 1916, plus, plus, plus.

(4) Globulin test. Jan. 24, 1916, Ross-Jones test positive. Noguchi, positive. Feb. 28, 1916, Ross-Jones test plus, plus. Noguchi, plus, plus.

Case 29461. — T. H. A man aged forty-eight, native American of Irish parentage. Plumber and professional baseball player by occupation. Civil condition, married. He was committed to this hospital on March 18, 1915. The physicians' certificate describes patient as cleanly, talking incessantly and boisterously, ideas of exaltation, expressing queer moral and religious ideas, marked insomnia, with "hallucinations of business deals." The family history is negative to insanity. The personal history furnishes a record of excessive use of alcohol from age of nineteen to forty-three. Successful in his business. Married six years ago. No children. Had reputation for drinking and carousing while in baseball company. Generous and jolly in disposition. Venereal history unknown. The onset occurred about March, 1914. Began with nervousness and insomnia; six months ago considered taking a rest for nervous breakdown. Talked about big business deals. Eight days ago became excited, talkative and his conversation showed repetition. A physical and neurological examination showed a geographic tongue; right naso-labial fold more marked than the left. General feeling of well-being. Pupils are equal and regular, but react sluggishly through a small arc to light. The right hand grasp is a little stronger than the left. Walks on a wide base. Reflexes exaggerated throughout. Knee jerks third degree. Slight radial sclerosis. Blood pressure 148. Pyorrhea alveolaris. No genital scars. Urinalysis negative.

In the early part of his hospital residence he was noisy, loud talking,

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distractible, generally excited and garrulous, showed pressure of activity, restless in his room, lack of judgment, rambling and boastful in conversation, full of explanations which failed to explain. Later he quieted down, but remained emotionally unstable, with impaired judgment, tendency to fabrication, talkative, voluble, expansive and grandiose in his ideas. Admits venereal infection about six years ago.

On May 18 he was recorded as reacting to auditory hallucinations, talking to imaginary friends outside of his window. Disoriented for time, excited, elated, at times aggressive and violent, requiring the use of sedatives. By November, 1915, he had quieted down and had gained sufficient self-control to live in Lincoln 1.

Treatment. — Total arsenic drug equals 8.7 grams.

(*a*) Diarsenol. From Jan. 5, 1916, to Jan. 21, 1916, inclusive, 6 intravenous injections, total, 2.7 grams.

(*b*) Arsenobenzol: From Jan. 25, 1916, to March 7, 1916, inclusive, 11 intravenous injections; total, 6 grams.

Laboratory Findings. — (*a*) Wassermann Reactions in Blood Sera: From Jan. 6, 1916, to Feb. 5, 1916, inclusive, 8 positive reactions reported by State Department of Health Laboratory. Feb. 7, 1916, negative reaction. Feb. 18, 1916, positive reaction. Feb. 25, 1916, unsatisfactory reaction. March 3, 1916, positive reaction. March 4, 1916, positive reaction.

(*b*) Wassermann Reactions in Spinal Fluid: March 24, 1915, positive reaction. March 3, 1916, positive reaction.

(*c*) Spinal Fluid Examinations: (1) Gold chloride test. Jan. 24, 1916, 4–4–3–4–4–3–2–1–±–±—positive. February 28, 1916, ±–±–1–1–±–0–0–0–0–0–0—weak positive.

(2) Cytological count. Jan. 24, 1916, spinal fluid too bloody. Feb. 28, 1916, cells per centimeter in fresh fluid, 6.

(3) Albumen test. Jan. 24, 1916, plus, plus, plus. Feb. 28, 1916, plus, plus.

(4) Globulin test. Jan. 24, 1916. Ross-Jones, positive. Noguchi test, positive. Feb. 28, 1916. Ross-Jones, plus. Noguchi test, plus.

Briefly summarizing the foregoing three cases: —

1. The onset of the disease, as determined by statements of physicians, relatives and of the patient himself, occurred as follows: —

In one case, ten days prior to commitment.

In another case, fifteen days prior to commitment.

In still another, one year.

In the light of subsequent treatment, early diagnosis of general paresis, or at least of syphilitic involvement of the central nervous system, is of the utmost importance. Other observers, as I have already tried to point out, have shown that a much

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earlier diagnosis can be reached through persistent and thorough laboratory examinations than from the appearance of consistent clinical symptomatology.

Following treatment: —

2. Definite clinical improvement has occurred in two of the patients. One patient has shown resistiveness and lack of co-operation to such an extent as to classify him as not improved.

3. Definite results in the laboratory findings: —

(*a*) Gold chloride test, although still positive, much reduced in two cases. Slightly increased in the case refusing treatment.

(*b*) Albumen tests reduced in all three cases from three pluses to one plus.

(*c*) Globulin tests, slightly increased in one case; unchanged in other two cases.

(*d*) Cytological count reduced in one case from 125 to 3 cells per centimeter. Low normal count in both of the other cases (3 cells in one, 6 cells in the other).

(*e*) Wassermann reaction in spinal fluid: in one case from positive to unsatisfactory, November 10 to February 17 (case of G. H. D.), in other two cases unchanged, remaining positive.

(*f*) Wassermann reaction in blood sera: showed three negatives and one doubtful reaction in one case (G. H. D.), one unsatisfactory reaction in case of A. B., one negative, one unsatisfactory, and all other reactions positive in case of T. H.

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A CONTRIBUTION TO THE SYMPTOM COMPLEX ASSOCIATED WITH INTERPEDUNCULAR TUMORS.*

By H. I. Gosline, M.D.

PATHOLOGIST, WORCESTER STATE HOSPITAL, WORCESTER, MASS.

While the subject of pituitary tumors offers many problems of the greatest theoretical interest, it is true that it offers no fewer problems of immediate clinical and practical interest. The following case is presented with the idea that the correlation of certain of its symptoms with experimental observations may be of some value of the latter sort: —

The patient, J. C. (2d), a white male of thirty years, was born November, 1885, of Irish parentage.

The family history showed that the patient had four brothers and three sisters, living and well, and twin brothers and twin sisters who died shortly after birth. The informant thought the mother and father were dead. There was no history of heredity.

Past history showed that the patient was the second youngest child. His early life was normal. Education was rudimentary. In Ireland he worked as a farm laborer, but came to the United States in 1902, where he has worked as a coachman and carriage washer, earning as high as $12 to $14 a week. He was steady, saving, well liked; indulged in an occasional glass of beer. Married Nov. 25, 1913, he has twin boys, born October, 1914 (one year, eight months old). The wife has had no miscarriages.

The present illness began gradually in November, 1914, when the patient complained of feeling tired and sleepy all the time. He lost his job because he could not keep awake, and sleepiness became a cause of unsteady employment. In May, 1915, he would sleep most of the time, and when awake would talk and act peculiarly. His speech was incoherent. He would get up at night, dress and walk the streets looking for work. In June, 1915, he lost control of both sphincters for the first time. The patient was admitted to the wards July 8, 1915, on a certificate which stated that the attack began two months previously, though the patient had not worked steadily since the previous November and had been dementing since then. It was also stated that the patient was uncleanly, dull and apathetic, disoriented for time and showed poor memory for recent events.

The notes from the hospital record show that the patient was good-natured, quiet and tractable, and his conduct did not vary from this. He

* Presented in brief under the title "A Case of Brain Tumor with Some Symptoms" at a meeting of the Worcester District Medical Society held at the Worcester State Hospital March 8, 1916. Reprinted from the Journal of Nervous and Mental Disease, Vol. 45, No. 4, April, 1917.

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knew his name, but thought that he came to the hospital in May. He knew the hospital and its character. He did not feel that he was insane, but felt weak, nervous, run down, and that he could not eat anything. He had not observed that his memory was failing. More recently he had been troubled with headaches, and occasionally had had pains from the back going down either leg. He denied venereal infection, but admitted exposure. The mental examination revealed no delusions or hallucinations. Asked if he were married, patient says, "Yes, sir, I have a wife and two children — twins at that — one year old." Asked how he accounts for his present sickness, he says, "By Godfrey, I don't know."

Physical Examination. — Height, 5 feet, 5¾ inches; weight, 168 pounds; temperature, 99°; pulse, 82; respiration, 22. Well-nourished, extremities moist. Glands were slightly large in the groin. There was some edema of the prepuce, though no scars were seen. Pulmonary and vascular systems were negative except that the arteries were thought to be slightly hardened and the blood pressure was 140 systolic. Abdomen was negative. Urine negative. Wassermann on the blood and spinal fluid negative.

The pupils were equal and regular, but the reaction was sluggish and through a small arc. Visual fields showed bitemporal narrowing, not amounting to an hemianopsia. Reflexes were exaggerated. There was a fine, rapid, irregular tremor of the extended hands and of the tongue margin. Patient was unsteady in Romberg's position, and there was some tenderness on deep pressure over nerve-trunks.

A spinal puncture done on the morning of July 12 was followed in the evening by a severe vomiting spell, and by a second on the following morning. The patient became stuporous and lost control of the sphincters. For the next week control of sphincters improved, as did the mental condition. The patient talked coherently, but showed some difficulty called "ataxia." He denied pain. There were no hallucinations or delusions.

July 20 at 9.20 P.M. patient developed convulsions lasting fifteen minutes, and again at 10.40 P.M., lasting twenty minutes. He regained consciousness till 2 A.M., when a series of short convulsions occurred accompanied by unconsciousness which persisted till death. The movements were said to be general with frothing at the mouth. When seen by the physician in charge (Dr. H. C. Arey) they appeared to be confined to the respiratory apparatus. There was no cyanosis. Attempts to open the mouth caused firmer closure of the jaws. A cleansing enema was not returned till 2 P.M., when pupils were dilated and the temperature began to mount.

An ophthalmoscopic examination at this time showed a small hemorrhage in the left fundus, a larger one in the right fundus with the surrounding vessels engorged (Dr. G. E. Mott). Temperature 106°, pulse 148, respiration 20. Exitus 2.35 P.M., July 21, 1916.

The gradual onset of mental trouble in a previously normal man, accompanied by headache, "not being able to eat any-

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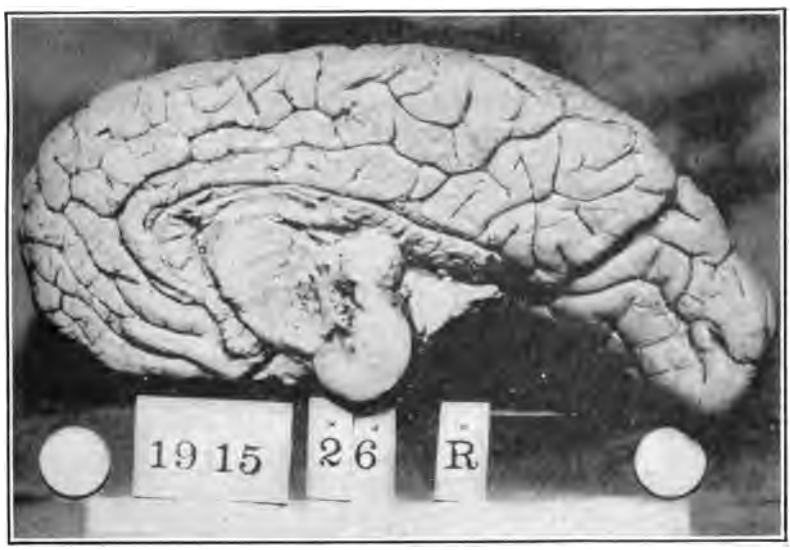

FIG. 1. — Photograph of the mesial aspect of the right hemisphere, showing the relations of the tumor to the corpus callosum, chiasm and pons. Several eroded areas appear in the tumor, some of them containing blood. The retrogressive changes here point to this location as the oldest part of the tumor, and lend support to the idea that the origin of the tumor was in the floor of the third ventricle.

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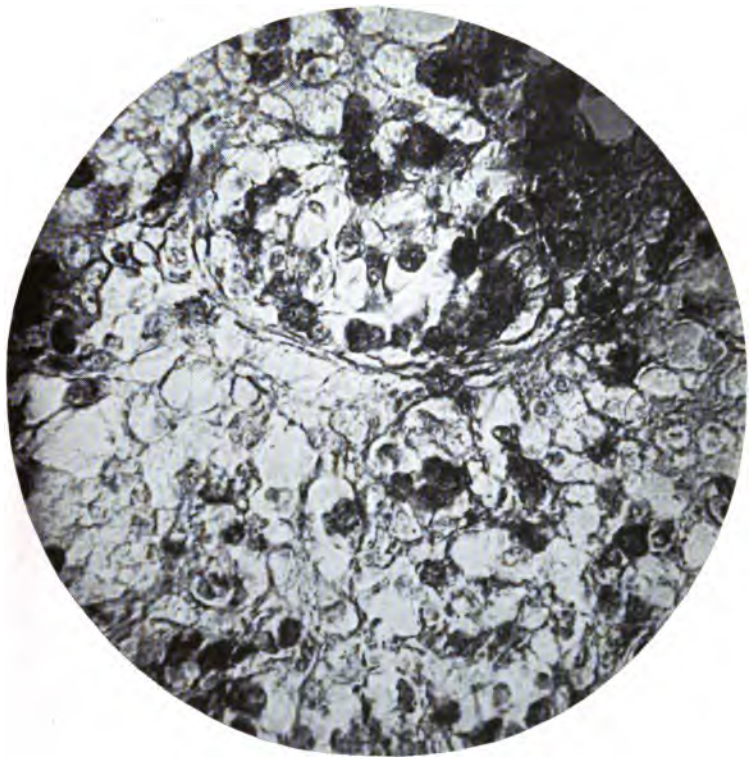

FIG. 2. — Photomicrograph of a cellular part of the tumor. Shows the intercellular substance and many undifferentiated cells, many poorly stained. (Lens 7a, Ocular 2. Eosin methylene blue stain on Zenkerized formalin tissue.)

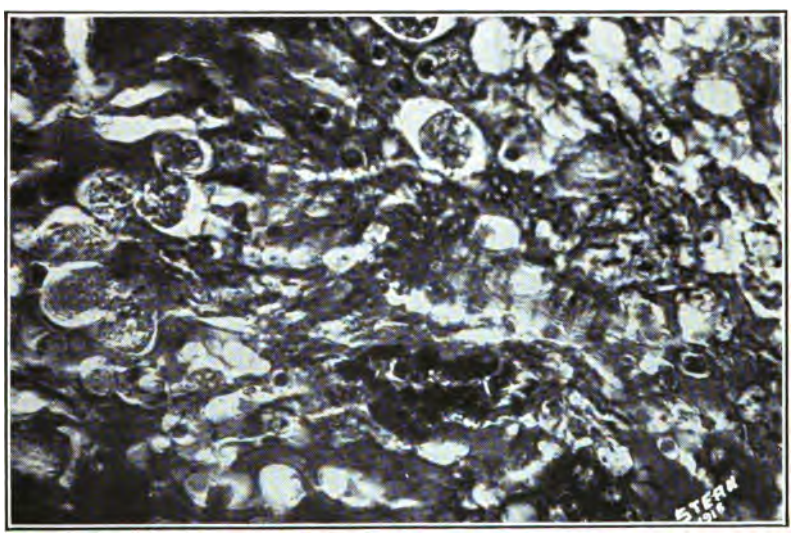

FIG. 3. — Another area showing more structure in the cells and intercellular substance. The small, black, round bodies are red blood corpuscles which will serve as a standard for the size of the other structures. (Lens 7, Ocular 1, the bellows of the camera pulled far out. Mallory's connective tissue stain.)

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thing," together with bitemporal limitation of the fields of vision, can point to very few things. The difficulty in this case seems to have been on the mental side. While loss of sphincter control, incoherence and the night-walking incident are equivocal symptoms, being equally well produced by a disordered motor apparatus or by a disordered will to use an intact apparatus, disorientation and poor memory as they occurred in this case are signs of mental deterioration. But they are the only signs. Certainly the replies quoted above to several questions were those of a normal man. The speech at the hospital was thought to be "ataxic" rather than incoherent. There were confirmatory neurological signs.

It was somewhat along these lines that the diagnosis of brain tumor in the region of the pituitary was made. In addition, it was thought that the patient's somnolence might be a clue to the origin of the tumor. This opens a question which may now be asked very properly in the light of recent work on the pituitary by Cushing and Goetsch.[1] How far can somnolence, as distinguished from coma or from stupor or from other semiconscious and unconscious states, serve as a sign of pituitary disorder? Whether rightfully or not the sign was considered to indicate pituitary disease by the diagnostician in this case, and double certainty was felt because of the patient's subjective feeling of weakness and of being "run down." He had the characteristic lethargy of hibernation. The patient may be said to have been hibernating. It is to be regretted that the other signs of hibernation were not tested in this case owing to the short duration after reaching the hospital. These signs are a low respiratory quotient, low body temperature, brachycardia, slowed respiration, lowered blood pressure, relative peristaltic inactivity, and marked insensitivity to painful or emotional stimuli.

On the mental side there was nothing characteristic of the disease. Disorientation and memory failure have frequently been observed with pituitary disorder, but they occur in so many other conditions that they have no pathognomonic value. Dullness and apathy noted in the case were doubtless a function of the patient's asthenia and drowsiness, if they were not asthenia and drowsiness themselves misinterpreted. The patient was apparently not demented. To say that a patient is demented is like saying he has a pain, except that the latter is subjective and the former is supposed to be objective. The night-walking incident was probably caused by the patient's disorientation for time, the loss

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having extended to the power of distinguishing night-time from daytime. Those who would assume that the patient had another sign of dementia called confusion must account for the fact that the patient dressed before going out. Confused patients leave the house without the usual preliminaries of toilet. As there are centers in the cortex and thalamus whose stimulation causes reactions in the genital region, one must consider that disturbance of the paths connecting those distant regions may cause disturbances in one or the other of them, and that untidiness is then no longer a sign of impairment of the prefrontal inhibitions.

Physically the patient was somewhat overweight, but not sufficiently to suspect pluriglandular disease. The temperature at entrance and the blood pressure are against the hibernation idea of the man's drowsiness, but it is possible that they were terminal events. Respiration was always slow though not pathologically so, perhaps. Finally, it should be noted that the patient's drowsiness was not like that produced by intracranial pressure.

Pathological Report.

Autopsy four hours post mortem. Body was hairy over chest, limbs and pubes. Right pupil measured 3 millimeters vertical, 4 millimeters horizontal diameter. Left pupil measured 3 millimeters × 3 millimeters. External genitals undersized. Rigor mortis especially marked in the jaw. Panniculus 1.5 centimeter over thorax, 3 centimeters over abdomen. The omentum was laden with fat. The appendix measured 13 centimeters in length. Pleural adhesions present over middle and lower lobes of right lung. The lungs weighed, right 424 grams; left 395 grams. The middle lobe of the right lung was very rudimentary. Infarct of the lung. The heart weighed 340 grams. Vascular system normal appearing. Kidneys weighed, right 155 grams; left 162 grams. Accessory artery to upper pole of each kidney and the kidneys were lobulated. Left kidney showed one scar from an old infarct. Passive congestion was present in kidneys. Adrenals appeared normal. The spleen weighed 170 grams. It showed fetal lobulations and was very soft. The liver weighed 1,645 grams and showed fetal lobulations. Pancreas appeared normal as did the gastrointestinal tract. There was a small hydrocele on the right. Testicle did not thread well.

Central Nervous System. — Palpation through the dura revealed increased consistency over the first and second frontals on the

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right. Brain weighed 1,445 grams. The frontal area appeared to bulge forward. The Sylvian fissure took a more horizontal course than usual. The left hemisphere was fluctuant, suggesting a dilated lateral ventricle. The convolutions were large and flat and lay closely approximated. At the base was a tumor mass measuring 4 centimeters × 4 centimeters, extending from the optic chiasm anteriorly to the pons posteriorly, filling the entire anterior and posterior perforated space, overlying the mammillary bodies and separating the optic tracts widely. Section through the corpus callosum in the plane through the great longitudinal fissure showed that the tumor mass extended superiorly to the corpus callosum, filling the anterior genu, and extended posteriorly to the pars intermedia of the thalamus, filling the third ventricle. The tumor mass was soft and friable; showed eroded areas and small areas containing a reddish fluid.

Horizontal sections were made of the brain after it had been hardened in formalin. The tumor was very compact in its lower part and more expanded above. It was not so extensive on the left as on the right, and yet the left ventricle extended higher on the left than on the right, and fluctuation was noted on the left at autopsy, before the brain was hardened. This apparent anomaly is explained by the fact that the tumor did not block the foramen of Monro on the right, in spite of its larger size, but did block the foramen of the left side. Corresponding with the larger size of the tumor on the right was a feeling of increased resistance over the first and second frontals of that side, felt at autopsy.

The frontal limb of the internal capsule was distorted on the right. Perhaps to this was due the "ataxic" speech. The caudate nucleus was distorted or absent on the left. The thalamus was distorted on both sides.

The posterior surface of the sella was eroded offering communication into the sphenoidal sinus.

Spinal cord was normal.

Ophthalmoscopic examination repeated post mortem by another observer showed a large retinal hemorrhage in the right fundus and a smaller linear one in the left.

The cut surface of the tumor after hardening showed areas of an opalescent, refractile cartilage — or colloid — appearance.

Sections were stained for microscopic study by kresyl-violet, thionin, Weigert's neuroglia method, van Gieson's method, hematoxylin and eosin (Weigert's, Delafield's and Mayer's being tried),

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Mallory's phosphotungstic acid hematoxylin and the connective tissue stain and by eosin methylene-blue. The striking thing was the remarkable difficulty experienced in getting a stain to "take." Mallory's connective tissue stain was the only one that could be said to have succeeded easily, and this was true mainly of its capacity to stain the intercellular substance, for it did not stain the cells well. Sections stained by eosin methylene-blue had to be treated four times the usual length of time required, and with double-strength stain. Eosinophilic cells were completely lacking as were basophilic cells. All cells appeared to be neutral. There was no tendency to cord formation with alveoli, but in parts there were masses of cells and in other parts few cells with a great preponderance of intercellular substance staining blue with the connective tissue stain and hence belonging to the group of connective tissues, amyloid, mucous and hyaline substances. Near blood vessels were structureless masses staining red, probably fibrin. The cells seemed to belong to the undifferentiated anterior lobe cells.

Discussion.

Considering first the local clinical signs in the light of the autopsy findings it may be thought from the gross findings that the exaggerated reflexes, unsteady Romberg, tremor and "ataxia" of speech were caused by direct pressure upon the peduncles, or, perhaps more likely, by involvement of the motor pathways internally by the tumor. The question of untidiness cannot be helped by this case, as the tumor was so extensive as to involve the thalamus and paths from both the central and frontal regions.

The slight abnormality of shape of the pupils may have been missed clinically or may have been a terminal thing. Possibly it has no great significance.

The finding of rigor especially marked in the jaw is worthy of note in view of the firmer closure of the jaw on attempted opening shortly before death.

The peculiar fetal state of the shape of the organs and the predominance of the lymphoid structures are striking.

The undersized genitals with good growth of hair, if due to pituitary disorder at all in this case, points to the adult type of Fröhlich's syndrome in which reversion to the infantile type occurs. The adiposity in this case was not marked, pointing to rather insignificant involvement of the posterior portion of the gland.

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The microscopic findings, if considered with the asthenic, drowsy state of our patient, assume a unique position.

At the time of the appearance of Cushing's monograph, it was felt that asthenia and drowsiness when combined with adiposity, high sugar tolerance, subnormal temperature and slowed pulse were due to secretory deficiency of the posterior lobe.[2] However, in two cases (XVI and XXXVI)[3] in which these symptoms were improved by glandular feeding whole gland was used, and in one (XXXVI) thyroid was added. In another case[4] benefited by injections of boiled gland and finally by implantation whole gland was used. The aim at that time was not directed to alleviating individual symptoms, but the prophecy was made that at some future date we might be able to distinguish and treat disorders of separate parts of the gland.[5] The feeding experiments, then, have shed no light thus far on the question as to which part of the gland caused the improvement of the asthenia and drowsiness noted in Cushing's cases, or whether the improvement was due to the combined actions of the total gland.

It now appears that somnolence in an individual with other of the cardinal signs of hibernation may point to a special sort of disorder of the anterior lobe of the pituitary, just as a peculiar distribution of fat in the body together with genital hypoplasia (dystrophia adiposo-genitalis typus Fröhlich) and high sugar tolerance unquestionably points to hypopituitarism. It will be seen that this assumption is based only on the association of asthenia and somnolence with a tumor whose cells resemble the undifferentiated cells of the hibernating animal. The idea of cause and effect between two associated conditions is recognized as one of the most naïve, and it may be that more critical study later will reveal that the association is merely a chance one.

Another matter of importance in this case is the number of twin-pregnancies in this family group. This offers a coincidence of unusual theoretical interest in view of the known connection between pituitary disorder and changes in structure and function in the internal genitals. Of course the current views concerning twin-pregnancies would deny to this high incidence any more than passing notice. But when one considers that our theories of twin-pregnancies are based mainly upon the evidence of comparative embryology, and that even here the evidence is not entirely unequivocal, the matter at once assumes importance. Twin-pregnancies are not the rule in pituitary disorders, doubtless, but further clinical observation may show that sexual varia-

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tions of one sort or another are the rule. Merely by way of analogy, I would mention the phenomena in quite a different field, in order to cover the idea. I mean the phenomena of group reactions among the unorganized substances such as proteins and lipoids. While pituitary disorder may not necessarily produce twin-pregnancies, it may always produce sexual variations of some sort. Whether the converse would be true is perhaps less probable.

Summary.

A male of thirty years has active symptoms of eight months' duration characterized by drowsiness of such persistence that he lost various positions. He dies with signs of interpeduncular tumor.

The tumor is made up of undifferentiated anterior lobe cells such as are found in the hibernating animal, and a correlation is suggested between tumors of this sort and the possibility of human hibernation.

There was a high incidence of twins in the immediate family of the patient. His organs showed fetal lobulations and other variations from the normal.

I wish to thank my technician, Miss Sherwood, whose patience made possible the study with stains, and my assistant, Mr. Stean, who labored with the microphotographs. The clinical records are the work of my colleagues on the medical staff of the hospital.

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3. *Ibid.*
4. *Ibid.*, p. 320.
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STATISTICS OF SIX THOUSAND PSYCHOPATHIC HOSPITAL CASES.*

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Purpose of Study.
Criticism of Material.
Methods used in ordering Material.
Analysis of Material.
I. Seven major groups.
II. Separate diagnostic groups by decades and sex. Charts and tables.
III. Total material by decades and sex. Charts and tables.
Summary.

PURPOSE OF STUDY.

In the course of a study of psychoses of the fifth and sixth decades in patients at the Psychopathic Hospital, it became desirable for purposes of comparison to find out the distribution according to sex, age and diagnosis of a large number of cases. For this purpose about 6,000 cases were utilized, comprising all admissions to the hospital for approximately three years. The data when collated appeared to have some general statistical value, and are therefore presented separately.

CRITICISM OF MATERIAL.

In considering the separate diagnosis, the existence of minor variations in the classification of mental disorders at the Psychopathic Hospital should be borne in mind. In general, the grouping of Kraepelin has been followed, but not by any means rigidly. The staff of assistant physicians has been changed and renewed at least twice during the time covered by the admission of the 6,000 cases. The permanent members of the staff have not themselves used any rigid formulas of diagnosis, nor impressed conformity upon the assistant physicians. The latter, coming from various places and bringing their traditions with them, have tended to cause variation from time to time in the manner of viewing certain groups of cases. Other new trends in

* Being Contributions of the Massachusetts Commission on Mental Diseases, whole number 170 (1916.28). The previous contribution, No. 169 (1916.27), was by H. I. Gosline, entitled "Kraepelin on 'Paranoid Conditions,'" a translation, published in the Alienist and Neurologist, Vol. 37, No. 2, May, 1916.

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diagnosis have resulted from the study of particular groups of mental diseases at the hospital. The extent of these variations can be shown best by examples. A case, which at one time might have been called an involutional psychosis, might at another be called manic-depressive depression. A case might be, at different times, called presenile psychosis or dementia præcox. A paranoid condition might at another time have been called paraphrenia or a paranoid form of dementia præcox.

It should be kept in mind also that some of the diagnoses represent groups which are limited by peculiarities in the rules of admission to the hospital. The cases of delirium tremens, which are by law excluded, were admitted possibly upon mistakes in diagnosis in the admission office, or possibly developed after admission, or in some cases were taken in from considerations of humanity. The same thing is true of the small group of drug addictions. These groups are therefore not present in the proportion of their incidence among the population from which the hospital draws its cases.

The nature of the material has been influenced also by the success of the Psychopathic Hospital in reaching many incipient, slight and doubtful cases of mental disorder which would not ordinarily be seen in State hospitals for the insane. For this reason Table I, which shows the 6,000 cases arranged by sexes according to diagnosis, probably approximates the actual incidence of mental disorder in the community. In order, however, to afford a fair basis for comparison with State hospital statistics, deductions from the total admissions should be made, as follows: —

	Males.	Females.	Total.
Psychoneuroses,	82	189	271
Feeble-minded,	166	221	387
Psychopathic personalities,	23	49	72
Defective delinquents,	34	80	114
Not insane,	304	258	562
	609	797	1,406

These groups include roughly the "not insane," though it is recognized that some individuals of the psychoneurotics and psychopathic personalities especially are properly committable to institutions for the insane. In a general study like the present,

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however, one must deal with groups and not with individuals, and undoubtedly for comparison of statistics the exclusion of these groups will cause less error than their presence. Subtracting these from the total admissions we have as the total of the insane: —

Male,	2,516
Female,	2,078
Total,	4,594
Male (per cent.),	54.8
Female (per cent.),	45.2

METHODS USED IN ORDERING MATERIAL.

The data were derived from the index cards in the permanent files of the Psychopathic Hospital. In cases of doubt the original records were referred to. The facts noted, diagnosis, age and sex have been combined to show various relations in Tables I, II, III and IV.

The charts represent the different diagnoses distributed according to sex in decades. In most cases there are two charts to each diagnosis, one representing actual numbers, the other representing for each sex the percentage of cases which falls in each decade.

The decennial unit was chosen so as to furnish a consistent basis for comparison with psychoses occurring in the fifth and sixth decades (to a study of which the present paper is accessory), and also as a commentary on observations made by Dr. Southard (American Journal of Insanity, 1914, Vol. LXX, pp. 779–828) concerning psychoses in other decades. The choice of such a time unit also eliminated minor inaccuracies in the giving of ages by patients. It was found, for example, in an attempt to use the year as unit, that there was a noticeable heaping up of cases in years which were multiples of 5 and 10, due doubtless to ages being given in rough approximation, as "about 45" or "about 50," and so on. The decennial unit also diminishes the error due to the age at admission being often different from the age at onset, the latter of course being the more significant. In the charts showing numbers of cases, each square measured vertically represents five cases, except in charts 33 and 34, where each vertical square represents 25 cases. In the charts

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showing percentages, each vertical square represents 2 per cent. Dotted lines are used to indicate females and solid lines to indicate males.

ANALYSIS OF MATERIAL.

It is apparent, upon glancing at Table I, that of the thirty groups listed there a few include a great proportion of the cases. Most of the minor groups can perhaps be looked upon as related to these few major groups. The entire material indeed might with advantage be placed into seven larger classes approximating those suggested by Kraepelin (Vol. II, Ed. VIII, pp. 15–19), as shown in Table II. The unclassified and not insane groups are excluded. These seven groups will be considered first, and then the various diagnoses will be considered separately.

I. Seven Major Groups.

The varying proportions of the sexes affected in different groups are noticeable. In the first group (Table II) the more exposed life of men, and in the second the predominance of alcoholism and syphilis, are obviously the principal causes of the respective proportions of 66.7 per cent. men and 74.3 per cent. men. In the third group the proportion of women would be much increased if the group of arteriosclerotic psychoses had not been included. It will be noticed from Table I that the proportion of 2 women to 1 man in the senile dementia group is almost exactly reversed in the arteriosclerotic group.

In the fourth group, which includes dementia præcox and epilepsy, and comprises nearly one-third of the entire number of cases, the sexes are divided equally. This is true of no other considerable group. It will be shown later that there are differences between the sexes in the distribution of the dementia præcox cases as to age.

The fifth group shows a decidedly larger number of women. This is much more marked in the psychoneuroses (70 per cent. women) than in the manic-depressive psychoses (57 per cent. women). Of the latter the depressed psychoses show the largest proportion of women.

The larger number of women in the sixth and seventh groups is due apparently to the tendency of subnormal and abnormal women to get into sexual difficulties, while men of the same grades more easily escape notice. The proportion of the sexes

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is the same for the total of the seven groups in Table II and the total admissions shown in Table I, namely, about 52 per cent. men and 48 per cent. women.

II. Separate Diagnostic Groups by Decades and Sex.

Manic-depressive Psychoses.

The manic-depressive cases number 613, of which 57.1 per cent. are females. The group comprises 10.22 per cent. of the total admissions and 13.34 per cent. of the insane. The actual numbers of men and women by decades are shown in chart 1. The cases are distributed continuously from the second to the eighth decade, but by far the greatest number is found between twenty and sixty. The number of females is greatest in the fourth decade, where it is nearly double that of males. In the following decades females decrease rapidly. The maximum for males falls in the third decade, and there is only a small decrease each decade until the seventh.

No account has been taken of whether the patient was admitted in the first or in a subsequent attack. The ages of admission, therefore, deviate farther from the ages of onset than in any of the other groups.

A consideration of the depressions and manias separately, as shown in charts 2 and 3, shows interesting differences. As in the general group, the maximum for females in both falls in the fourth decade, the number of manias being slightly greater than the number of depressions. The rapid drop after the fourth decade in women in chart 1 is modified in chart 2 (depressions) by the number in the sixth decade being nearly the same as in the fifth. The rapid decrease of maniacal phases (chart 3) with advancing years is thus responsible for the gradual decline in chart 1.

In males the depressive phase shows an unbroken increase to the sixth decade, which is the maximum. In maniacal phases the maximum for men falls in the third decade, and declines rapidly thereafter, broken by a maintenance of level in the fifth and sixth decades. In the second decade for depressions, and in the sixth and seventh for manias, males are in excess of females. Everywhere else females equal or outnumber males.

The relations of manias to depressions (sex being disregarded) is shown graphically in chart 4. The manias dominate during the third and fourth decades, while in the fifth, sixth and seventh the depressions are in excess.

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The mixed phases of manic-depressive psychoses included only 19 cases, which were too few to be charted. The rarity of this diagnosis in comparison to the frequency with which it appears in Kraepelin's statistics is very noticeable. The difference is due probably in part to a tendency at the Psychopathic Hospital to assimilate mixed cases with the nearest of the two extreme groups, and partly to reluctance to conform entirely to the close analysis at Kraepelin's clinic, through which "mixed" qualities were discovered in a larger number of cases.

Undoubtedly also the mixture of races in Boston has considerable influence in modifying the proportion of frequency of different phases. This variety in types in different races is referred to by Kraepelin with reference to the Javanese, whom he compares to adolescent Europeans, in that both show a predominance of the maniacal forms. Comparison of the proportion of the different phases in the heterogeneous Psychopathic Hospital cases with the relatively homogeneous cases of Kraepelin's clinic, in advanced middle age (sixth decade), shows the following:* —

	Kraepelin.	Psychopathic Hospital.
Manic,	6.4	43
Mixed,	22.2	-
Depressed,	71.4	57

Charts 5 and 6, showing the percentage of each sex in each decade in manias and depressions, respectively, accentuate what has already been pointed out.

Unclassified Depressions.

The group called unclassified depressions (chart 7) includes 50 cases in which the outstanding feature was depression, and in which not enough other symptoms were present during residence in the hospital to permit of an accurate diagnosis. Males and females appear in equal numbers, and the only noticeable feature about the group is the predominance of females in the sixth decade.

Involutional and Presenile.

These two diagnoses are combined, because the terms have not been kept entirely separate in use. The group is not a

* Kraepelin, Psychiatrie, Eighth Edition, Vol. III, 1357, Deduction from Fig. 254.

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uniform one. It contains some cases corresponding to the older involutional melancholia, and also a number of obscure cases in which the chief feature, aside from age, is a lack of clear alignment in any other group. Undoubtedly many similar cases have been included under other headings. On account of the usual association of females with involutional changes the group shows a great predominance of women. Furthermore, the great majority of cases occur in the fifth and sixth decades (chart 8).

Senile Dementia.

The cases of senile dementia numbered 224, and included twice as many women as men. The graphs (chart 9) for the two sexes show that this excess is distributed from the sixth to the ninth decades. In the last three decades the proportion of women to men increases regularly: seventh, 1.5 to 1; eighth, 1.8 to 1; ninth, 2 to + 1. A study of the percentage of each sex in each decade (chart 10) shows that the largest proportion of both men and women is found in the seventies. There is some tendency for men to be affected earlier than women, but on the whole the proportions at the different ages are very similar.

Arteriosclerotic Dementia.

In this group, which numbers 178 cases, there are only half as many women as men (chart 11). The maximum falls in the seventh decade for men, and in the eighth decade for women. The excess of men decreases in the last four decades, until, in the eighties, there are as many women as men.

Decade.	Women.	Men.
Fifth,	1	5.0
Sixth,	1	6.8
Seventh,	1	2.6
Eighth,	1	1.1
Ninth,	1	1.0

Chart 12, which shows proportional distribution of sexes in decades, indicates clearly the early occurrence of arteriosclerotic psychoses in men.

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Psychoneuroses.

This term is used to include hysteria, neurasthenia and psychasthenia. On account of the continuous transition between those conditions and relative normality, the group naturally has no calculable relation to the incidence of psychoneuroses in the community. The number of cases is 271, with a proportion of 7 women to 3 men. The excess of women is greatest in the second decade (chart 13), the proportion to men being 4.3 to 1. The maxima for both men and women fall in the third decade, after which there is a regular decrease in both sexes. The relative proportions of each sex in each decade are shown in chart 14.

Feeble-minded.

The charts (15 and 16) of the feeble-minded have such a form as might have been expected. Females are in excess, doubtless from social reasons. The large numbers in the second and third decades appear to correspond with the increasing demands of life upon inadequate minds. According to chart 16 the percentage distribution of the sexes is about the same in every decade.

Epilepsy.

The group (chart 17) of epileptics cannot be taken as fairly representative. The conditions of the hospital have brought about rather the selection of cases which showed marked psychotic symptoms, and of those in which there seemed some possibility of establishing etiological factors. The group shows, however, the usual excess of males, although the percentage (53) is less than that usually given.* No attempt has been made to separate the cases of alcoholic epilepsy, but probably the greater number has been included under chronic alcoholism.

Paresis.

The cases (chart 18) number 395, divided in the proportions of 82 per cent. men to 18 per cent. women. Those in the first decade and part of those in the second are congenital. The relation of women to men in the different decades is as follows: —

* The average of a large number of observations quoted by Kraeplin gives 64 per cent. males. Kraeplin, Psychiatrie, Eighth Edition, Vol. III, 1109.

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Decade.	Women.	Men.
First,	1	2.0
Second,	1	6.0
Third,	1	7.0
Fourth,	1	4.4
Fifth,	1	4.5
Sixth,	1	3.9
Seventh,	1	6.0
Eighth,	-	3.0

The excess of males reaches two maxima, the first in the third decade, and the second in the seventh. In the intervening years the proportion of women to men increases so that during the fifties the ratio is nearly twice that found in the twenties. Chart 19 represents for each sex the percentage of the total number of cases which falls in each decade. The following table gives the percentages: —

	Decades.							
	I.	II.	III.	IV.	V.	VI.	VII.	VIII.
Men,	.5	1.9	6.5	37.0	30.9	16.7	5.6	.9
Women,	1.4	1.4	4.2	38.0	31.0	19.8	4.2	-

This tendency for the later development of paresis in women is shown also by other statistics which include a much larger number of cases.* One is inclined to lay some emphasis upon external factors, such as head injuries, in precipitating the disease earlier in men than in women.† It seems possible, also, that men may acquire syphilis in early youth from a number of women less in the aggregate than those whom they later infect. Such a supposition might account in part for the early excess of men, and for the later development of the disease in women.

Cerebrospinal Syphilis.

This group (chart 20) includes the cases of luetic brain disease with psychosis, which cannot be called paresis. It includes

* Junius und Arndt, Archiv. f. Psych. u Nervenkrankheiten, 1908, 44, 249.
† Berger, Trauma und Psychose. Berlin, 1915.

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meningitis, vascular disease and gumma. It does not possess sufficient unity to be of value for analysis. It is interesting to note, however, that of the 94 cases 68 per cent. are men, the same proportion as found in arteriosclerotic psychoses.

Alcoholic Hallucinosis.

The cases number 260, of which 72 per cent. are men. They begin abruptly after 20 (charts 21 and 22), reach a maximum in the thirties and forties, and then gradually decline, a few cases being found even in the eighth decade. The chart for women is somewhat similar to that for men, but presents a slight decline in the fifth decade, in which the men hold their maximum level. An examination of the percentage of each sex in each decade shows that the disease tends to develop earlier in men, but that beyond the fortieth year the sexes are affected in about the same proportions. The percentages referred to are as follows: —

	Decades.					
	III.	IV.	V.	VI.	VII.	VIII.
Men, ...	18.8	32.2	32.2	13.4	2.6	.8
Women, ...	13.5	40.5	31.1	12.1	1.4	1.4

They are shown graphically in chart 22.

Delirium Tremens.

Of the 232 delirium tremens cases, 82 per cent. were males (chart 23). The distribution of cases by decades is very much like that of alcoholic hallucinosis. The maximum lies in the fourth decade for both sexes. There is a slight reduction in the fifth decade, with a much more rapid one thereafter.

The proportion of cases in each decade for the sexes separately is as follows: —

	Decades.					
	III.	IV.	V.	VI.	VII.	VIII.
Men, ...	15.8	36.3	33.7	11.1	2.1	1.0
Women, ...	19.5	40.5	33.3	2.2	4.5	-

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Chart 24, which is constructed from these figures, indicates clearly that delirium tremens develops earlier in women than in men, that in the forties the sexes were affected to about the same degree, but that in the subsequent decade the number of men was proportionately greater. The larger proportion of women shown in the seventh decade is without significance, on account of the small number of cases. The relation between alcoholic hallucinosis and delirium tremens will be referred to again in connection with dementia præcox.

Chronic Alcoholism.

This diagnosis is made at the Psychopathic Hospital with the understanding that distinct evidence of psychosis is present. The group includes patients who show considerable deterioration, including some cases of alcoholic epilepsy. There is a separate group of alcoholic delusional psychosis (Eifersuchtswahn), which consists of 15 cases, — 12 men and 3 women. These were not charted. The chronic alcoholics (chart 25) show a predominance of men at every age, and a fairly regular curve, with maximum in the fifth decade. In the group are 133 cases, with 68 per cent. men and 32 per cent. women.

Korsakow's Disease.

This group with 57 cases shows a larger proportion of women than any other of the alcoholic psychoses, namely, 40 per cent. In the fourth decade women are in considerable excess (chart 26), but are elsewhere fewer than men.

The proportional numbers for each sex by decades are: —

	Decades.				
	III.	IV.	V.	VI.	VII.
Men, ...	11.8	17.6	32.3	29.4	8.9
Women, ...	13.0	53.0	21.0	13.0	-

In this group two-thirds of the women, but less than one-third of the men, were affected before forty, and of all cases 44 per cent. occurred before forty. These figures stand in contrast to Kraepelin's, which show only 33 per cent. women in all, and only 24.5 per cent. developing before forty.*

* Kraepelin, Psychiatrie, Eighth Edition, 1910, Vol. II, 181.

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Dementia Præcox.

The distribution by decades of this group is shown in chart 27. Cases are found in every decade from the second to the ninth. Although the sexes are equally represented, they occur in different proportions at different ages. Males were found at an earlier age than females, the former being in considerable excess up to the thirtieth year. The following table, giving percentages of each sex separately in each decade, shows that of the total number, 60.7 per cent. of the males and 42.3 per cent. of the females were admitted before the thirtieth year: —

	Decades.						
	II.	III.	IV.	V.	VI.	VII.	VIII.
Males, ...	12.6	48.1	26.4	9.7	3.0	.2	-
Females, ...	9.6	32.7	38.0	15.7	3.7	.1	.2

The later incidence of the disease in females is very noticeable from thirty to fifty, and is apparent throughout the sixth decade. It is interesting that no increase in the number of female patients about the menopause is shown.

The assumption has frequently been made that alcoholic hallucinosis is closely allied to dementia præcox. Upon comparing the charts of the proportional distribution of the alcoholic psychoses by sexes (charts 22 and 24) with chart 27 of dementia præcox, one fact worthy of notice in this connection is apparent.*

The tendency to the earlier appearance of alcoholic psychoses in women is reversed in the third decade in alcoholic hallucinosis, so that the proportions approximate those found in dementia præcox. It has been mentioned already that nearly half the cases of dementia præcox occur in the third decade, as against a third of the female cases. If one assume that alcoholic hallucinosis occurs more readily in those predisposed to dementia præcox, an excess of males in the third decade might be expected. In the following decades such a tendency would exert an opposite effect on account of the excess of females, but this effect would be masked by the greater proportion of women characteristic of this decade in the alcoholic psychoses. In fact, delir-

* The sexes in dementia præcox are so nearly equally divided that chart 27, which shows absolute numbers by sexes, is practically comparable with charts 22 and 24, which show relative distribution.

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ium tremens shows as large a proportion of females in the fourth decade as does alcoholic hallucinosis, — nearly 40.5 per cent. of all the women. The tacit assumption implied in considering the two alcoholic psychoses together rests upon the remarkable correspondence in the relative numbers of females occurring in the fourth and fifth decades. These figures are repeated here for convenience.

	Decades.					
	III.	IV.	V.	VI.	VII.	VIII.
Alcoholic hallucinosis, . .	13.5	40.5	31.1	12.1	1.4	1.4
Delirium tremens, . . .	19.5	40.5	33.3	2.2	4.5	-

Chart 27 (dementia præcox) throws no light upon the relative excess of women in the sixth decade in alcoholic hallucinosis.

An alternative explanation of the relative excess of males in the third decade in alcoholic hallucinosis is that a certain number of genuine cases of dementia præcox which happen to develop in alcoholics, or in which alcoholism may be a symptom, may be erroneously called alcoholic hallucinosis. On account of the large proportion of dementia præcox cases in the third decade, such cases would naturally be more numerous during the twenties.

Unclassified Psychoses.

The patients included in this group have in common only the facts that they have psychoses and that these could not be definitely diagnosed. They number 431, of whom 52 per cent. are women. The numbers of each sex in each decade are shown in chart 28, and the proportional part of the men and women separately in each decade is shown in chart 29. These cases are most numerous in the thirties, and decrease rather slowly through the fifth and sixth decades. Both charts approximate normal frequency distributions, and show only two features worthy of mention, — the larger proportions of men in the fourth decade, and of women in the sixth. It will be noticed by reference to the charts that paresis and alcoholic psychoses are the only groups which show a great predominance of men in the fourth decade. It is possible that the similar condition shown on chart 29 may be due to the same causes, which were unrecognized. The large number of women in the sixth decade is not surprising

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in view of the similar proportions in such indefinite groups as the unclassified depressions (chart 7) and the involutional and presenile psychoses (chart 8), which are commonly thought to be associated with the menopause.

Not Insane.

This group, consisting of 562 cases (54.1 per cent. male, 45.9 per cent. female, chart 30), illustrates one important function of the Psychopathic Hospital. In nearly all the question of psychosis has arisen, and the patients have been sent or have come voluntarily to have the question answered. Although the answer has been in the negative, undoubtedly most of the individuals fall near the limits of normal variations. The outline of the area representing men in chart 31 (percentage distributions by decades) corresponds roughly with the outline for men in chart 32, which shows the total admissions.* For the women, however, there is a distinct skewing of the curve to the left, the greatest percentage of women (34.4) falling in the second decade. This is probably due largely to girls who have fallen into the care of various corrective agencies on account of social difficulties, and have been referred to the Psychopathic Hospital for examination. The groups of psychopathic personalities, defective delinquents and feeble-minded, according to Table II, show this same heaping up in the second decade. Undoubtedly many cases in the not insane group might better have been placed in one of the other groups. It is likely, for example, that many diagnoses such as not insane (psychoneurosis) have been classified as not insane simply for the reason that it would probably be more illuminating to consider together the groups deducted as "not committable" from the total of admissions in Table I.

These groups, numbering 1,406 cases, 797 female and 609 male, are shown in their proportional distribution in chart 32. The figures upon which the chart is based are as follows: —

	Decades.									
	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.
Males, . . .	4.1	24.8	25.1	17.2	13.3	11.3	3.6	.4	.2	-
Females, . . .	1.9	37.7	26.6	16.3	9.8	5.8	1.1	.6	.1	.1

* In chart 33 each vertical square represents 25 cases instead of 5, as in the other charts.

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The diagnosis of defective delinquent, which was made in 114 cases, was later abandoned because it was considered a "social" diagnosis and not a psychiatric one. Later cases of the same kind were classified as feeble-minded, as psychopathic personality, or perhaps in some cases as not insane.

The group of psychopathic personalities corresponds generally to the similarly named group of Kraepelin's classification.

Feeble-mindedness is used generally to include all grades of inherent intellectual defect.

Minor Groups.

The unclassified paranoid group includes cases which have delusions, usually persecutory, but are without symptoms definite enough to allow them to be placed in any well-recognized group. This diagnosis was rarely used in the latter half of the cases, being replaced by such diagnosis as paranoid dementia præcox, or, in a few cases, paranoia. These terms were used in conformity with the descriptions in Kraepelin's eighth edition.

Organic dementia includes cases associated with gross brain disease, and some cases in which the presence of organic brain disease is inferred from neurological signs, but not definitely shown. It is probable that some cases of arteriosclerotic dementia are included.

The traumatic, infectious and symptomatic groups are not homogeneous, and are not suitable for statistical purposes. They make up altogether less than 1.5 per cent. of the total admissions.

III. Total Material by Decades and Sex.

Total Admissions.

Chart 33 shows the distribution by decades of the entire 6,000 cases. Absolute numbers are shown, each square measured vertically, representing 25 cases. Chart 34 shows the total number of cases less the groups which include the non-committable cases, namely, psychoneuroses, psychopathic personalities, feeble-minded, defective delinquents, not insane.

Chart 35 shows the cases included in chart 34, grouped according to the proportional numbers of each sex in each decade. Comparison of charts 33 and 34 shows that after the thirtieth year they are nearly the same. Reference to chart 32 and to the percentages upon which it is based shows that of the excluded groups 66.2 per cent. of the females and 54 per cent. of the males are under thirty.

Of the total admissions to the hospital, 52.1 per cent. were

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men and 47.9 per cent. were women. The distributions of these in ten-year periods is shown in chart 33, and the proportion of each sex in each period in chart 36. The actual number of cases is shown in Table II. The percentages on which chart 36 is based are as follows: —

	Decades.								
	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.
Males, ...	1.0	9.8	23.2	23.7	19.2	13.0	7.0	2.7	.4
Females, ...	.8	14.3	21.3	24.6	17.2	11.7	5.3	3.8	1.0

Charts 34 and 35 are more comparable with the statistics of other hospitals because they include only the "committable" groups. The maximum number for both sexes falls in the thirties. The curves for both sexes increase in each period to the apex and decrease in each period thereafter.

Considering relative numbers, chart 35 shows that the same proportion of males and females was admitted in the first and second decades, but that in the third decade there was a large percentage of men. Thereafter the proportion of females was larger in each decade except the fifth and seventh.

Table IV shows for each decade the percentage of each sex affected by the various "committable" mental diseases. The great predominance of one or two diagnoses in the early and late decades is in marked contrast to the more nearly equal distributions among many groups in the years of middle life. The prominence of the indefinite groups of unclassified, presenile and involutional in females in the fifth and sixth decades is very striking.

SUMMARY.

1. A statistical account of 6,000 consecutive admissions to the Psychopathic Hospital, Boston, is presented. The data considered are the diagnosis, the sex, and the age by decades.

2. The cases upon which the study is based include, in addition to groups found in State hospitals of the usual type, a considerable proportion which represents mental disorder but not "insanity" in the legal sense. These are the groups which are responsive to the special appeal of a psychopathic hospital. The statistics, therefore, as a whole present a more accurate picture of the entire incidence of mental disorder in the community than reports from State hospitals.

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3. The use of the decennial unit avoids to a large extent errors in statement of ages, and allows any psychotic forms characteristic of the principal epochs of life to appear more clearly. According to Table IV the predominant diagnosis in the various ten-year periods are as follows: —

First Decade. — Congenital syphilis.

Second and Third Decades. — Dementia præcox with manic-depressive types increasing in prominence.

Fourth Decade. — Dementia præcox still most prominent, with paresis and alcoholic psychoses increasing in males, and manic-depressive psychoses in females.

Fifth and Sixth Decades. — For men, the decade is characterized by the occurrence of several forms in about equal number, namely, paresis, manic-depressive psychosis, dementia præcox, delirium tremens, alcoholic hallucinosis, arteriosclerotic psychosis, etc. For women there is a tendency to ill-defined forms which are not easily diagnosed. Of these the groups of presenile, involutional and unclassified psychoses make up in the two decades, respectively, 22.1 and 33.8 per cent.

Seventh Decade and Following. — Senile and arteriosclerotic psychoses are the prevalent ones, comprising about half in the seventh decade and a much larger proportion subsequently.

4. The large proportion of cases in the fifth and sixth decades which are left "unclassified" or placed in the indefinite and unsatisfactory groups of presenile and involutional psychoses indicates the need for further work upon psychoses occurring between the fortieth and sixtieth years.

5. Males predominate in the groups of mental disorder associated with brain injuries and gross diseases, and with exogenous factors (Table II).

Females predominate in the groups of congenital manic-depressive psychoses, psychoneuroses and the psychoses characteristic of advanced age. The exception to this is the group of arteriosclerotic predominance of females among the feeble-minded, probably due to social causes.

The endogenous deteriorations form the only considerable group in which the sexes are equal in number.

6. In the manic-depressive psychoses, the maximum for males falls, for depressions, in the sixth decade; for manias, in the third. For females the maximum for both types falls in the fourth decade. Disregarding sex, manias predominate before and depressions after the fortieth year.

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7. In senile dementia there are twice as many females as males, and males tend to be affected earlier.

8. In arteriosclerotic dementia males are twice as numerous as females. After the seventieth year the sexes are approximately equal. Possibly by this difference in the sexes as to age incidence males and females respond, respectively, to exogenous and endogenous factors in the production of cerebral arteriosclerosis, as suggested in paragraph 5.

9. In the psychoneuroses there is an absolute excess of females in every significant decade of psychoneurotics. Considering the proportion of the total number of each which is found in each decennial period, the percentage of males is in excess in each decade except the second and fifth.

10. In the feeble-minded, females are in considerable excess, but the distribution by percentage of each sex separately in decades shows that the same proportion of males and females falls in each ten-year period.

11. In paresis males outnumber females 4 to 1. There is apparently a tendency for the disease to develop earlier in men.

12. The usual proportions of 8 cases of alcoholic hallucinosis to 1 of delirium tremens does not hold in these statistics, on account of the legal restrictions against admission of patients with the latter disease. Of the cases of alcoholic hallucinosis 28 per cent. are women, while of delirium tremens only 18 per cent. are women. Of all the cases occurring before forty there is a larger percentage of women than men, but in the twenties, in alcoholic hallucinosis, this proportion is reversed, and the men are in excess.

13. Females form 40 per cent. of the cases of Korsakow; of these, 66 per cent. were under forty, while of the men less than 30 per cent. were under forty. In the Psychopathic Hospital females are therefore affected in larger proportion and at an earlier age than in Kraepelin's statistics.

14. Dementia præcox appears equally in males and females. During the twenties males were in considerable excess, while during the thirties females were in excess. Fifty-seven and seven-tenths per cent. of all the females and 39.3 per cent of all the males were past thirty when admitted.

15. The suggestion is made that the tendency of males to dementia præcox in the third decade may be related to the unexpected excess of males in the third decade in alcoholic hallucinosis (paragraph 12 above). The question whether this may be due to error in diagnosis, or to community of origin in the two diseases, is left open.

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16. The specific diagnosis not insane was made in 9.37 per cent. of all admissions. The groups which may be considered made up of cases not committable as insane (though certain individuals in them may be committable) comprise together 1,406 cases, or 23.43 per cent. of all admissions. This group probably represents roughly an actual gain in psychiatric service to the community.

17. Of the total number of cases admitted there were 52.1 per cent. males and 47.9 per cent. females. The maxima for both sexes fall in the fourth decade. Numerically, women are in excess in the second, eighth and ninth decades. Considering the percentages in each decade of all women and of all men, women are relatively in excess in the second, fourth and eighth decades.

TABLE I. — *Classification of Patients admitted to the Psychopathic Hospital.*

DIAGNOSIS.	MALE.		FEMALE.		TOTAL.	
	Number.	Per Cent.	Number.	Per Cent.	Number.	Per Cent.
Organic dementia,	40	66.7	20	33.3	60	1.00
Alcoholic hallucinosis,	186	71.5	74	28.5	260	4.32
Delirium tremens,	190	81.9	42	18.1	232	3.86
Alcoholism, delusional,	12	80.0	3	20.0	15	.25
Chronic alcoholism,	90	67.6	43	32.4	133	2.22
Korsakow's psychosis,	34	59.6	23	40.4	57	.95
Toxic psychosis,	16	48.4	17	51.6	33	.55
Infectious psychosis,	4	40.0	6	60.0	10	.17
Symptomatic psychosis,	11	45.8	13	54.2	24	.40
Cerebrospinal syphilis,	64	68.1	30	31.9	94	1.58
Paresis,	324	82.0	71	18.0	395	6.58
Involutional,	4	6.1	62	93.9	66	1.10
Presenile,	15	23.4	49	76.6	64	1.06
Senile dementia,	83	36.6	141	63.4	224	3.74
Arteriosclerotic dementia,	120	67.4	58	32.6	178	2.96
Dementia præcox,	659	49.2	679	50.8	1,338	22.30
Paraphrenia,	24	47.1	27	52.9	51	.85
Unclassified paranoid,	33	38.8	52	61.2	85	1.42
Epilepsy,	90	52.9	61	47.1	151	2.52
Manic-depressive, mania,	154	45.7	183	54.3	337	5.62
Manic-depressive, depression,	104	40.5	153	59.5	257	4.28
Manic-depressive, mixed,	5	26.3	14	73.7	19	.32
Unclassified depression,	28	50.0	28	50.0	56	.93

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TABLE I. — *Classification of Patients admitted to the Psychopathic Hospital* — Concluded.

Diagnosis.	Male.		Female.		Total.	
	Number.	Per Cent.	Number.	Per Cent.	Number.	Per Cent.
Psychoneurosis,	82	30.3	189	69.7	271	4.51
Traumatic psychosis,	17	89.5	2	10.5	19	.32
Paranoia,	3	60.0	2	40.0	5	.09
Psychopathic personality,	23	31.9	49	68.1	72	1.20
Defective delinquent,	34	29.8	80	70.2	114	1.90
Feeble-minded,	166	42.9	221	57.1	387	6.45
Unclassified,	206	47.8	225	52.2	431	7.18
Not insane,	304	54.1	258	45.9	562	9.37
Total,	3,125	52.1	2,875	47.9	6,000	100.00
Deducting not insane groups: —						
Psychoneuroses,	82	–	189	–	271	–
Feeble-minded,	166	–	221	–	387	–
Psychopathic personality,	23	–	49	–	72	–
Defective delinquent,	34	–	80	–	114	–
Not insane,	304	–	258	–	562	–
	609	–	797	–	1,406	–
Grand total,	2,516	54.8	2,078	45.2	4,594	–

TABLE II. — *Showing Number and Percentages of Men and Women in the Major Diagnostic Groups.*

Diagnosis.	Male.		Female.		Total.	
	Number.	Per Cent.	Number.	Per Cent.	Number.	Per Cent.
Brain injuries and diseases,	40	66.7	20	33.7	60	1.2
Exogenous factors (alcohol, drugs, infections), cerebrospinal syphilis, general paralysis.	931	74.3	322	25.7	1,253	25.1
Incident to involutional years, — presenile, senile and arteriosclerotic psychoses.	222	41.7	310	58.3	532	10.6
Endogenous deteriorations (dementia præcox), epilepsy.	806	49.6	819	50.4	1,625	32.4
Manic-depressive, psychosis, psychoneurosis.	390	40.7	569	59.3	959	19.2
Paranoia, congenital mental anomalies, psychopathic personalities.	60	31.4	131	68.6	191	3.8
Feeble-mindedness,	166	42.9	221	57.1	387	7.7
	2,615	52.2	2,392	47.8	5,007	100.0

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TABLE III A. — *Showing the Number of Men under Each Diagnosis in Each Decade.*

DIAGNOSIS.	DECADES.									
	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.
Manic-depressive, mania,	–	16	45	37	24	24	7	–	–	–
Manic-depressive, depression,	–	1	17	21	27	29	9	–	–	–
Manic-depressive, mixed,	–	–	–	–	2	1	2	–	–	–
Unclassified depression,	–	–	2	8	6	8	3	1	–	–
Involutional,	–	–	–	–	–	2	2	–	–	–
Presenile,	–	–	–	–	3	7	5	–	–	–
Paranoia,	–	–	–	1	–	2	–	–	–	–
Paraphrenia,	–	–	1	11	7	4	1	–	–	–
Unclassified paranoid,	–	–	2	9	9	7	6	–	–	–
Senile dementia,	–	–	–	–	2	5	31	34	11	–
Arteriosclerotic dementia,	–	–	–	–	5	27	51	31	6	–
Organic dementia,	–	–	–	2	12	12	9	5	–	–
Psychoneurosis,	2	10	29	19	11	9	2	–	–	–
Feeble-minded,	3	69	53	19	12	8	2	–	–	–
Psychopathic personality,	1	1	8	3	7	3	–	–	–	–
Unclassified,	1	5	38	60	45	33	18	5	–	1
Defective delinquent,	2	27	5	–	–	–	–	–	–	–
Epilepsy,	1	13	35	19	13	4	5	–	–	–
Paresis,	2	6	21	120	100	54	18	3	–	–
Cerebrospinal syphilis,	6	8	8	9	13	14	5	1	–	–
Traumatic psychosis,	–	1	4	3	7	2	–	–	–	–
Alcoholic hallucinosis,	–	–	35	60	60	25	5	1	–	–
Delirium tremens,	–	–	30	69	64	21	4	2	–	–
Alcoholic, delusional,	–	–	1	2	6	2	1	–	–	–
Chronic alcoholism,	–	–	7	24	35	19	4	1	–	–
Korsakow's psychosis,	–	–	4	6	11	10	3	–	–	–
Not insane,	17	44	58	64	51	49	18	2	1	–
Toxic psychosis,	–	–	5	3	–	5	3	–	–	–
Infectious psychosis,	–	–	1	–	2	–	1	–	–	–
Symptomatic psychosis,	–	–	–	2	4	2	3	–	–	–
Dementia præcox,	–	83	317	174	64	20	1	–	–	–
	35	284	726	745	602	408	219	86	18	1

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TABLE III B. — *Showing the Number of Women under Each Diagnosis in Each Decade.*

DIAGNOSIS.	DECADES.									
	I.	II.	III.	IV.	V.	VI.	VII.	VIII.	IX.	X.
Manic-depressive, mania,	–	16	48	56	35	23	3	1	–	–
Manic-depressive, depression,	–	–	24	47	34	33	12	3	–	–
Manic-depressive, mixed,	–	–	2	3	4	2	2	1	–	–
Unclassified depression,	–	–	3	4	4	13	3	1	–	–
Involutional,	–	–	–	3	30	27	2	–	–	–
Presenile,	–	–	–	–	10	29	9	1	–	–
Dementia præcox,	–	65	222	258	106	25	1	2	–	–
Paranoia,	–	–	–	–	1	1	–	–	–	–
Paraphrenia,	–	–	–	8	7	6	6	–	–	–
Unclassified paranoid,	–	–	5	5	17	17	8	–	–	–
Senile dementia,	–	–	–	–	–	12	46	62	21	–
Arteriosclerotic dementia,	–	–	–	–	1	4	20	27	6	–
Organic dementia,	–	–	1	3	6	7	3	–	–	–
Unclassified,	2	11	38	53	52	46	17	5	1	–
Psychoneurosis,	2	43	54	40	31	16	2	1	–	–
Feeble-minded,	5	91	77	28	15	4	1	–	–	–
Psychopathic personality,	–	22	9	9	6	3	–	–	–	–
Defective delinquent,	–	56	21	2	1	–	–	–	–	–
Epilepsy,	1	12	13	17	13	5	–	–	–	–
Paresis,	1	1	3	27	22	14	3	–	–	–
Cerebrospinal syphilis,	1	3	7	9	4	3	1	1	–	–
Traumatic psychosis,	–	1	–	–	–	1	–	–	–	–
Alcoholic hallucinosis,	–	–	10	30	23	9	1	1	–	–
Delirium tremens,	–	–	8	17	14	1	2	–	–	–
Alcoholic, delusional,	–	–	–	1	1	1	–	–	–	–
Chronic alcoholism,	–	–	1	15	17	8	2	–	–	–
Korsakow's psychosis,	–	–	3	12	5	3	–	–	–	–
Not insane,	8	89	51	51	25	23	6	3	1	1
Toxic psychosis,	–	–	6	4	7	–	–	–	–	–
Infectious psychosis,	–	1	3	2	–	–	–	–	–	–
Symptomatic psychosis,	–	–	5	3	4	–	1	–	–	–
	20	411	614	707	495	336	151	109	29	1

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TABLE IV. — *Showing in Each Decade the Various Diagnoses in Order of Frequency, with the Number of Cases and the Percentage in Each Decade. Males and Females are shown separately.*

Decade I.

Diagnosis.	Male.		Diagnosis.	Female.	
	Number.	Per Cent.		Number.	Per Cent.
Cerebrospinal syphilis,	6	60	Unclassified,	2	40
Paresis,	2	20	Epilepsy,	1	20
Epilepsy,	1	10	Paresis,	1	20
Unclassified,	1	10	Cerebrospinal syphilis,	1	20

Decade II.

Dementia præcox,	83	62.4	Dementia præcox,	65	59.1
Manic-depressive,	17	12.8	Manic-depressive,	16	14.6
Epilepsy,	13	9.8	Epilepsy,	12	10.9
Cerebrospinal syphilis,	8	6.0	Unclassified,	11	10.0
Paresis,	6	4.5	Cerebrospinal syphilis,	3	2.7
Unclassified,	5	3.7	Paresis,	1	.9
Traumatic psychosis,	1	.8	Traumatic psychosis,	1	.9
			Infective-exhaustive,	1	.9

Decade III.

Dementia præcox,	320	55.8	Dementia præcox,	227	56.7
Manic-depressive,	62	10.8	Manic-depressive,	74	18.4
Unclassified,	38	6.6	Unclassified,	38	9.4
Epilepsy,	35	6.1	Infective-exhaustive,	14	3.7
Alcoholic hallucinosis,	35	6.1	Epilepsy,	13	3.2
Delirium tremens,	30	5.2	Alcoholic hallucinosis,	10	2.4
Paresis,	21	3.6	Delirium tremens,	8	2.0
Cerebrospinal syphilis,	8	1.4	Cerebrospinal syphilis,	7	1.7
Chronic alcoholism,	7	1.2	Korsakow's psychosis,	3	.7
Infective-exhaustive,	6	1.0	Paresis,	3	.7
Korsakow's psychosis,	4	.8	Unclassified depression,	3	.7
Traumatic psychosis,	4	.8	Organic dementia,	1	.2
Unclassified depression,	2	.4	Chronic alcoholism,	1	.2
Alcoholic, delusional,	1	.2			

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TABLE IV. — *Showing in Each Decade the Various Diagnoses in Order of Frequency, with the Number of Cases and the Percentage in Each Decade. Males and Females are shown separately* — Continued.

Decade IV.

Diagnosis.	Male.		Diagnosis.	Female.	
	Number.	Per Cent.		Number.	Per Cent.
Dementia præcox,	195	30.5	Dementia præcox,	271	46.9
Paresis,	120	18.8	Manic-depressive,	106	18.3
Delirium tremens,	69	10.8	Unclassified,	53	9.2
Alcoholic hallucinosis,	60	9.4	Alcoholic hallucinosis,	30	5.2
Unclassified,	60	9.4	Paresis,	27	4.7
Manic-depressive,	58	9.0	Delirium tremens,	17	2.9
Chronic alcoholism,	24	3.7	Epilepsy,	17	2.9
Epilepsy,	19	2.9	Chronic alcoholism,	15	2.6
Cerebrospinal syphilis,	9	1.4	Korsakow's psychosis,	12	2.1
Unclassified depression,	8	1.3	Cerebrospinal syphilis,	9	1.5
Korsakow's psychosis,	6	.9	Infective-exhaustive,	9	1.5
Infective-exhaustive,	5	.8	Unclassified depression,	4	.8
Traumatic psychosis,	3	.5	Involutional psychosis,	3	.6
Alcoholic, delusional,	2	.3	Organic dementia,	3	.6
Organic dementia,	2	.3	Alcoholic, delusional,	1	.2

Decade V.

Paresis,	100	19.2	Dementia præcox,	131	31.4
Dementia præcox,	80	15.3	Manic-depressive,	73	17.7
Delirium tremens,	64	12.3	Unclassified,	52	12.5
Alcoholic hallucinosis,	60	11.5	Involutional,	40	9.6
Manic-depressive,	53	10.2	Alcoholic hallucinosis,	23	5.5
Unclassified,	45	8.6	Paresis,	22	5.3
Chronic alcoholism,	35	6.7	Chronic alcoholism,	17	4.1
Epilepsy,	13	2.5	Delirium tremens,	14	3.3
Cerebrospinal syphilis,	13	2.5	Epilepsy,	13	3.1
Organic dementia,	12	2.3	Infective-exhaustive,	11	2.7
Korsakow's psychosis,	11	2.1	Organic dementia,	6	1.4
Traumatic psychosis,	7	1.3	Korsakow's psychosis,	5	1.2
Alcoholic, delusional,	6	1.1	Unclassified depression,	4	1.0

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TABLE IV. — *Showing in Each Decade the Various Diagnoses in Order of Frequency, with the Number of Cases and the Percentage of Each Decade. Males and Females are shown separately* — Concluded.

Decade IX.

DIAGNOSIS.	MALE.		DIAGNOSIS.	FEMALE.	
	Number.	Per Cent.		Number.	Per Cent.
Senile dementia, . . .	11	64.7	Senile dementia, . . .	21	75.0
Arteriosclerotic dementia, .	6	35.3	Arteriosclerotic dementia, .	6	21.4
			Unclassified, ...	1	3.6

Decade X.

Unclassified, ...	1	100			

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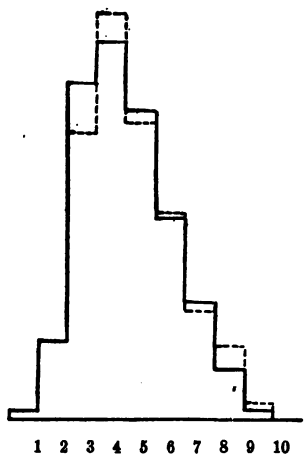
CHARTS OF 6,000 PSYCHOPATHIC HOSPITAL CASES.

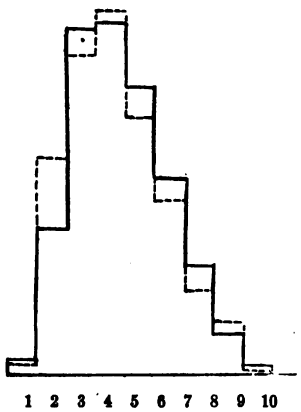
Explanation of Charts.

Each square horizontally represents one decade. In charts giving percentage distribution each square vertically represents 2 per cent.; in all other charts, except 33 and 34, vertical squares represent 5 cases. In charts 33 and 34 vertical squares represent 25 cases.



Total committable groups; per cent.

35



Total admissions; per cent.

36

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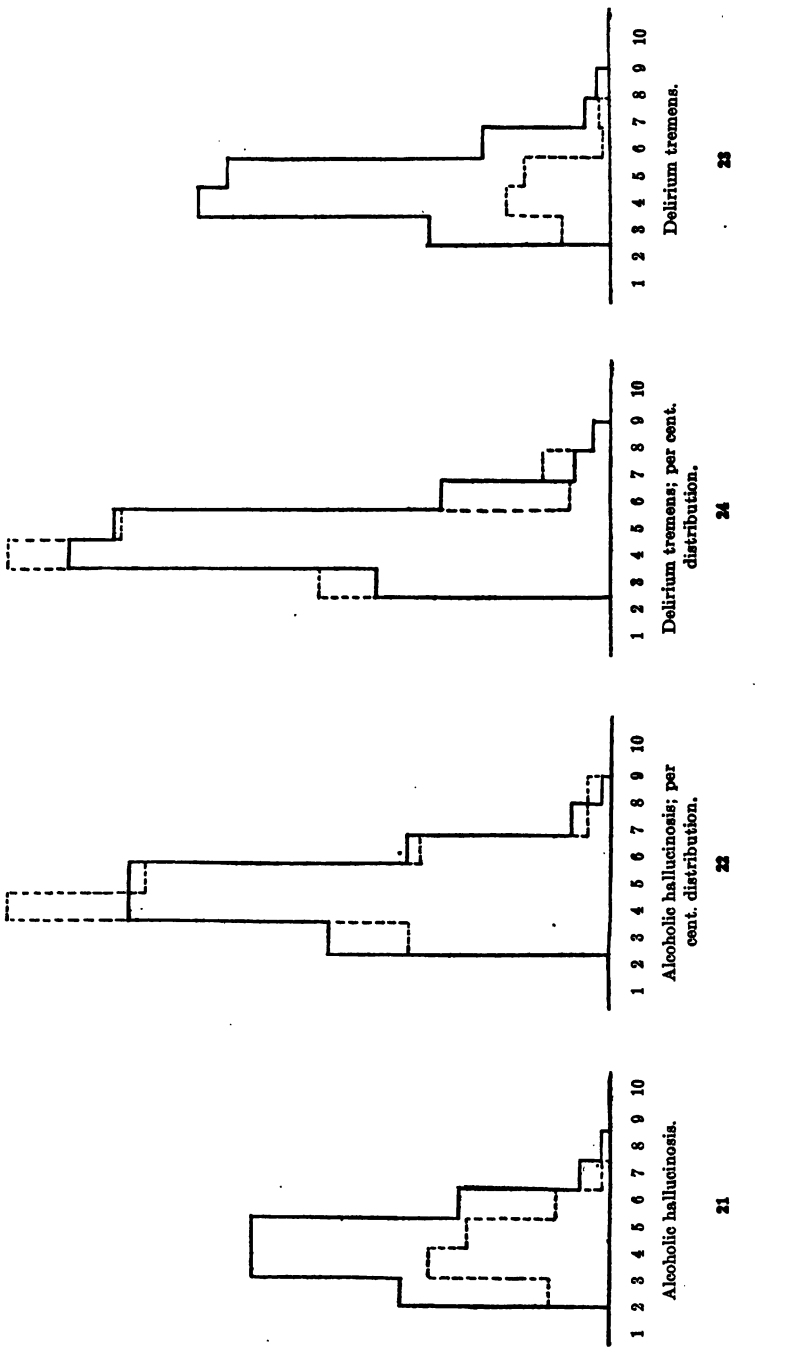

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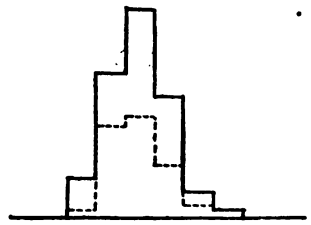
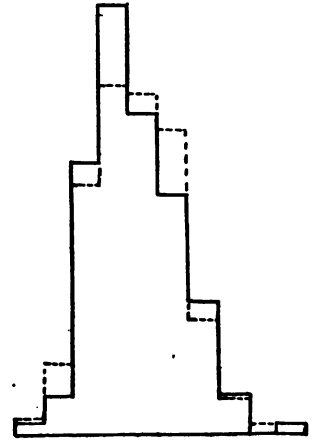


Chronic alcoholism.

25

Korsakow's psychosis.

26



Unclassified psychoses;
per cent.

29

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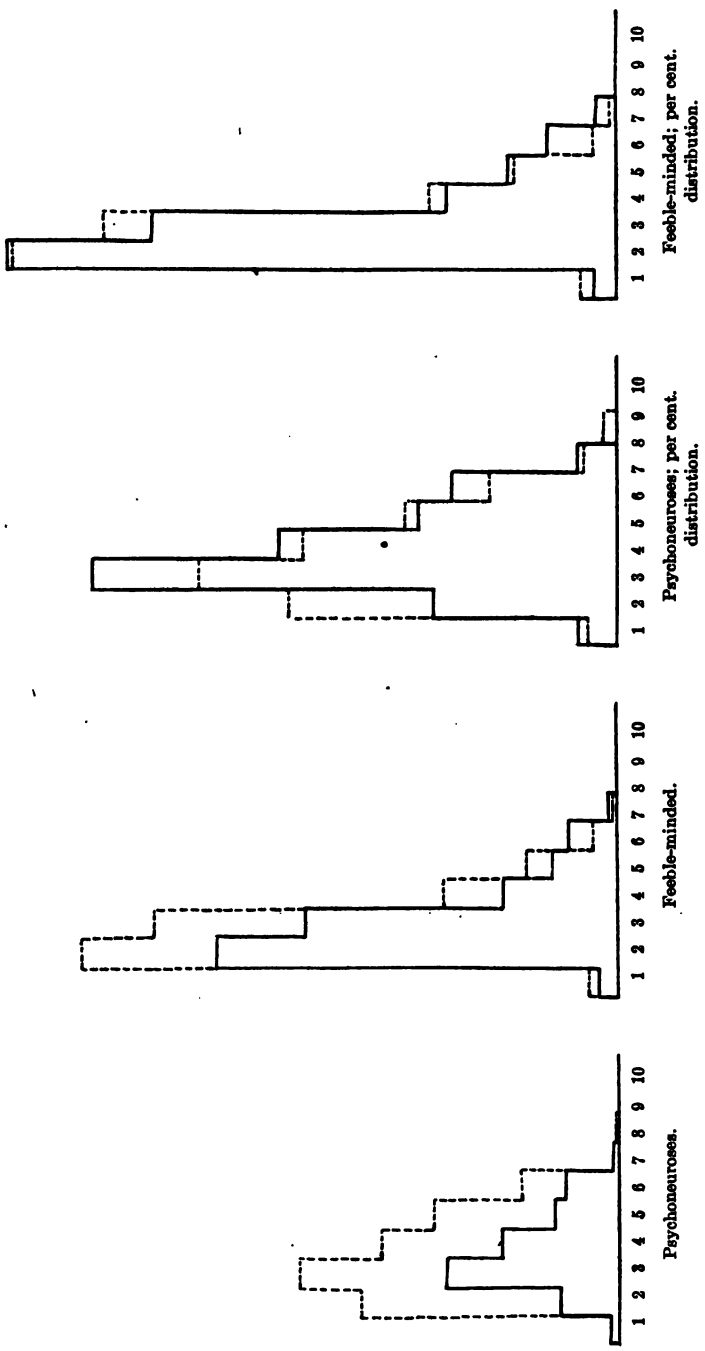

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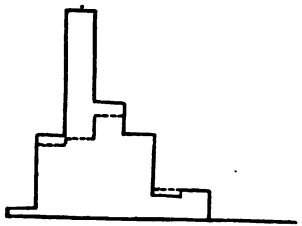
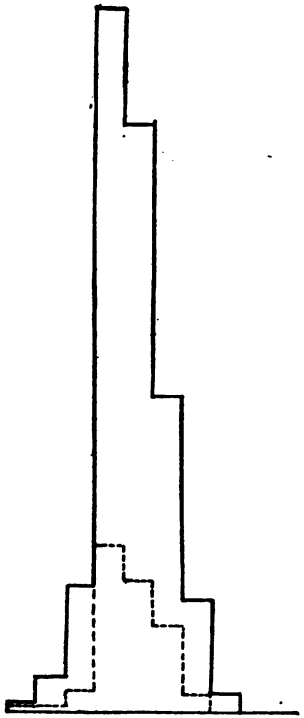


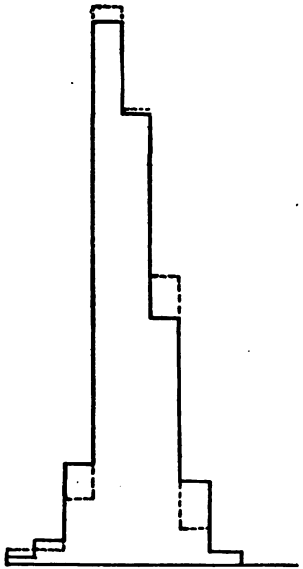
Epilepsy.

17



Paralytic dementia.

18



Paralytic dementia; per cent. distribution.

19

Cerebrospinal syphilis.

20

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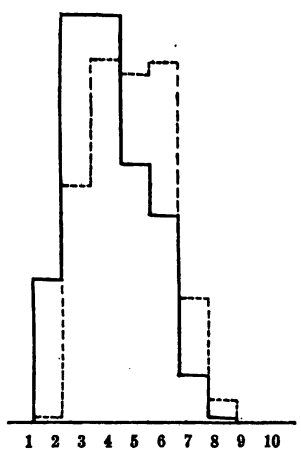
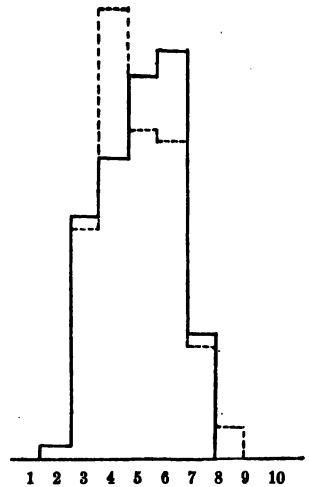


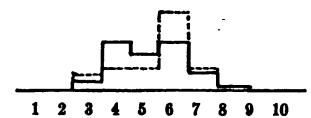
Per cent. distribution; manias (solid line); depressions (broken line).

4



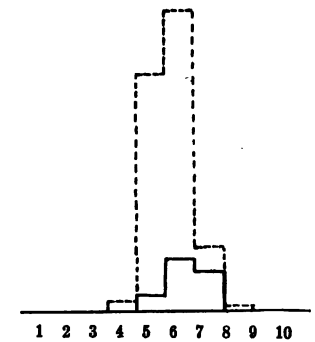
Manic-depressive depressions; per cent. distribution.

6



Unclassified depressions.

7



Presenile and involutional.

8

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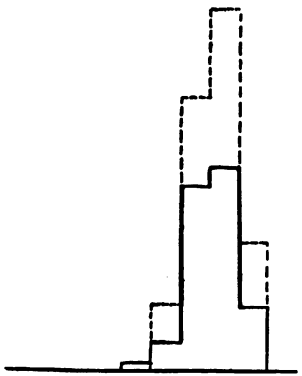
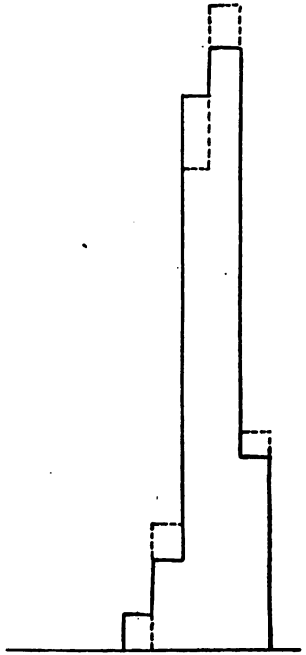


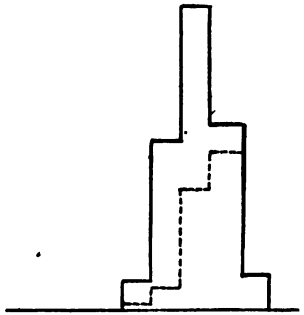
Senile dementia.

9



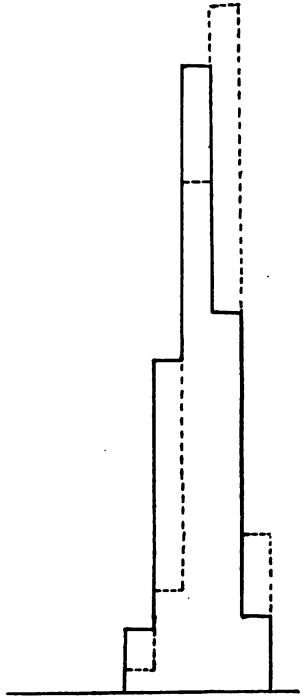
Senile dementia; per cent. distribution.

10



Arteriosclerotic dementia.

11



Arteriosclerotic dementia; per cent. distribution.

12

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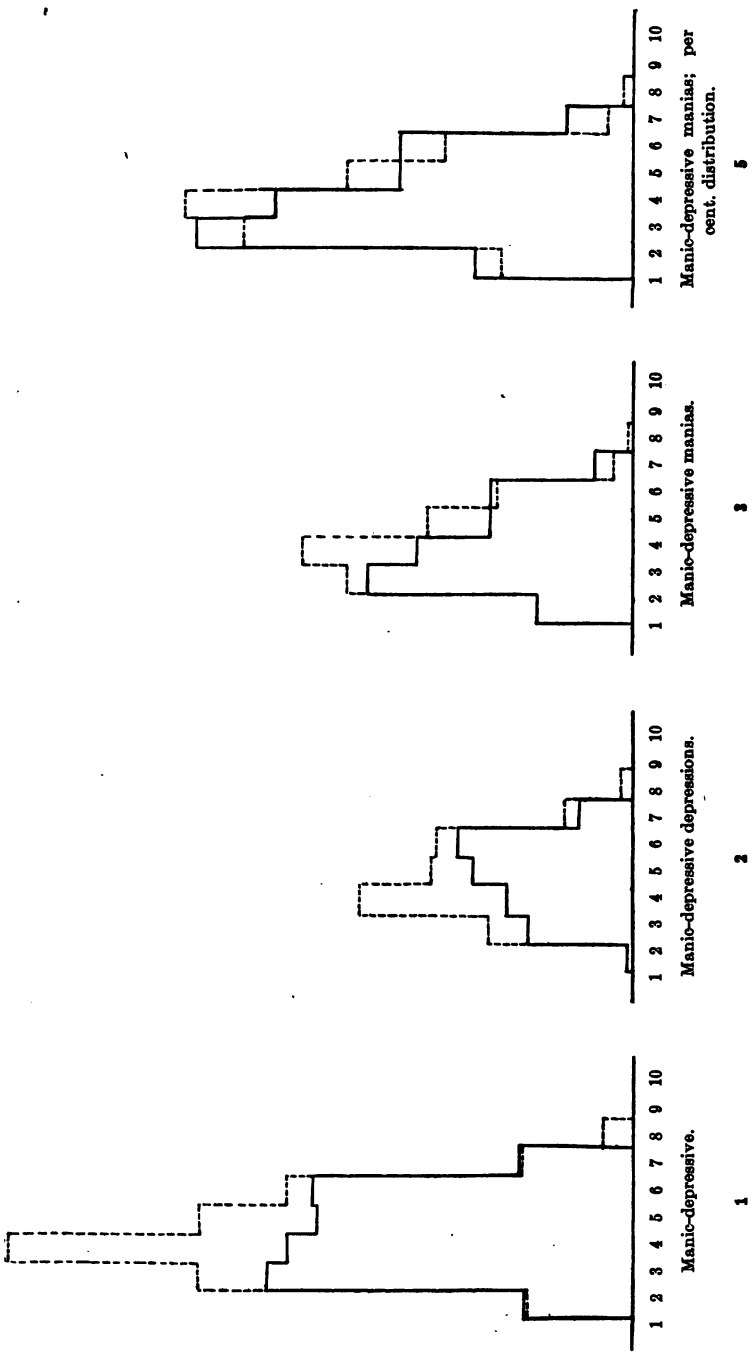

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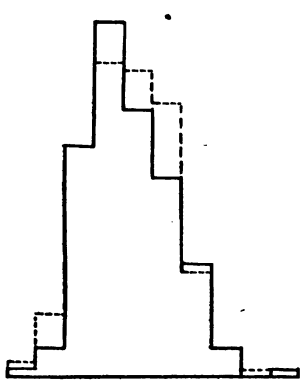
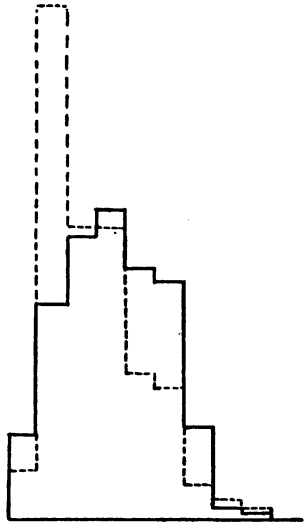


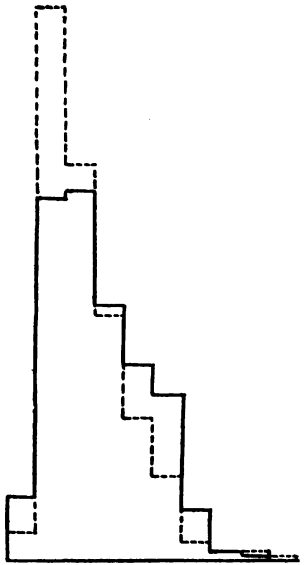
Unclassified psychoses.

28



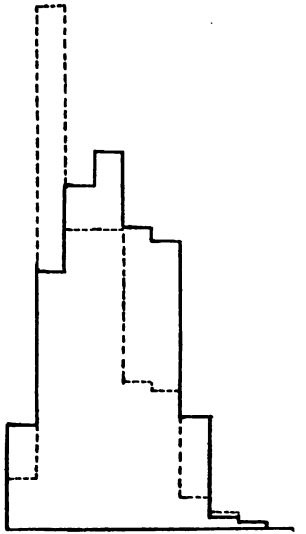
Not insane; per cent.

31



"Non-committable"; per cent. distribution.

32



Not insane.

30

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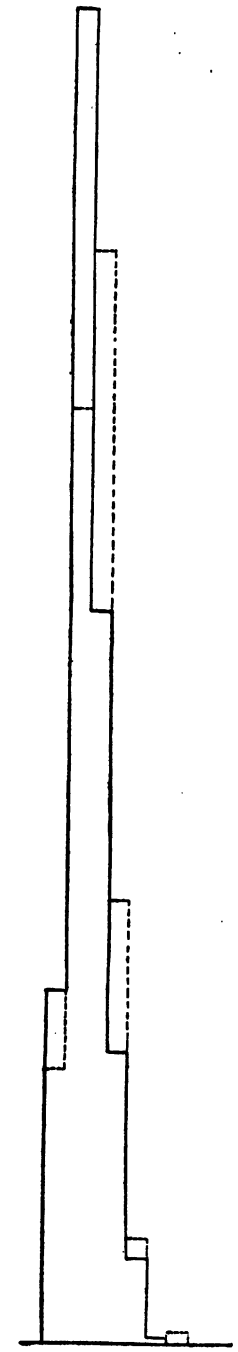
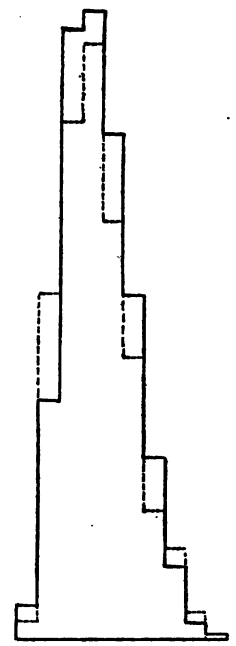


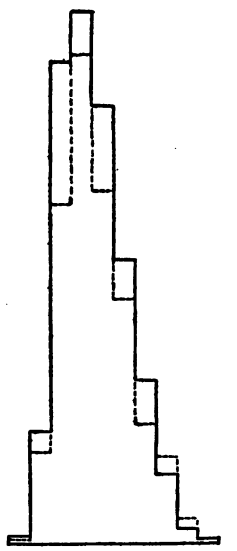
Dementia præcox.

27



Total admissions; 25 cases to vertical divisions.

33



Total committable groups; 25 cases to vertical divisions.

34

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THE VALUE AND MEANING OF THE ADDUCTOR RESPONSES OF THE LEG.*

By A. Myerson, M.D.,

CLINICAL DIRECTOR AND PATHOLOGIST, TAUNTON STATE HOSPITAL; FELLOW IN PSYCHIATRY, HARVARD UNIVERSITY.

In two previous papers I have described a series of periosteal reflexes invoked by percussion of the bones of the lower extremities and marked by the response of the adductor muscles. Conclusions reached in these papers have been added to, amended and altered by the results of the routine examination of patients for these reflexes in two years of active psychiatric hospital work. Therefore this paper is written to re-present the facts and to evaluate them. In addition, I wish to make in passing some observations on the adductor responses of the arms, these responses being, so far as I know, in general new to the literature.

There is a fairly copious literature which concerns itself with the adductor responses of the legs. Since the viewpoint of the writers has been different than my own, and, moreover, since their technique and examination of the reflexes described have differed still more widely, their work has but few points of contact with mine. The pioneer workers on reflexes gave their attention mainly to those elicited from tendons. Nevertheless, Erb,[2] Westphal and Strümpell also mentioned the homolateral adductor response elicited from the internal surface of the knee joint. Strümpell also pays some attention to the contralateral adductor elicited from the patellar tendon. This response, the classical contralateral adductor, aroused the attention of Sternberg, Hinsdale and Taylor,[5] Risien-Russell,[21] Purves, Féré, Marie,[13] Marinesco,[14] Ganeult,[3] Huismans,[7] Keller [10] and others, and opinion on its pathogenesis and meaning has varied very much. It may be said that in general the authors have considered this response a pathological one and indicating some disturbance of the nervous system. Other adductor responses were described by Berolotti [1] and Volabra (a contralateral elicited from the sole of the foot), and by Noica [18] and Strominger. The attention paid, however, has been scattering and unsystematized.

* Taunton State Hospital Papers, 1915, No. 1. Reprinted from The Journal of Nervous and Mental Disease, Vol. 43, No. 2, February, 1916.

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Technique. — It is necessary to emphasize the method used in eliciting the responses described in this paper, since no point in the elicitation of reflexes is more important than the posture of the parts concerned. Indeed, the posture is constituted by what Sherrington [22] calls the neural pattern. Therefore a definite posture means a definite arrangement of neuron relationships, and it is as necessary to maintain the same posture as it is in laboratory technique to use the same chemicals. It is also necessary to state, since this law of neurological technique is most often violated, to have the parts stimulated and the parts reacting nude. For the adductor reflexes in general the patient lies on his back as much relaxed as possible. The legs lie somewhat abducted and slightly outward rotated in what may be called the normal posture. It is absolutely essential that the adductors be relaxed, since it is obvious that if they be contracted their movements cannot be observed. (This, of course, does not apply in such conditions where adductor contracture is an involuntary process.) This point will bear emphasis because where people are shy, timid or apprehensive, the first group of muscles that they contract is the adductors, in what seems to be an instinctive effort to protect the genitalia. With an ordinary Taylor reflex hammer, and using force that does not invoke pain, the following sites are stimulated: first, the internal surface of the knee joint; second, the external surface; third, the internal malleolus; fourth, the sole of the foot near the arch; fifth, the tendo-Achillis; sixth, the anterior-superior spine. In eliciting the seventh, the response of the patellar tendon, it is necessary partially to flex the thigh upon the hip and the leg upon the thigh. It will be noted that all of these responses are elicited from bony surfaces except those from the Achilles and patellar tendons.

The direction of the blow must be considered. In the responses elicited from the external surfaces, such as the external condyle and anterior-superior spine, the blow is mainly inward, though in the latter case inward and downward. In those responses elicited from internal surfaces, such as the internal condyle, the middle of the shaft of the tibia and the Achilles tendon, the blow is directed outward. In those elicited from inferior surfaces, such as the sole of the foot and the patellar tendon when the knee is bent, the blow should be upward and toward the middle line of the body. As will be shown later the direction of the blow has much to do with the elicitation of these responses, and plays perhaps an important part in their pathogenesis.

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Responses. — The reflexes described in my previous papers and here re-presented can be divided as follows: —

1. A group where the homolateral adductor is more lively than the contralateral, more frequently and more easily elicited, provided that there is no difference in the reflexes of the two sides. The sites of stimulation for this group are as follows: —

(*a*) The internal side of the knee joint; that is to say, the internal condyle and the internal surface of the head of the tibia. This is probably the most common of the adductor responses.

(*b*) The middle of the shaft of the tibia. This response runs closely second to the above.

(*c*) The internal malleolus which gives a response not nearly so often as the above two.

(*d*) The Achilles tendon. From this site the response is about equal in frequency to that elicited from the internal malleolus.

2. A group where the contralateral adductor is more lively than the homolateral, more frequently and more easily elicited, provided, as in the above group, that there is no difference in the response of the two sides. The sites of stimulation for this group are as follows: —

(*a*) The sole of the foot. This is a rather common reflex and closely rivals in frequency those elicited from the internal condyle and middle of the tibial shaft of the previous group.

(*b*) Patellar tendon. This, as has been before stated, is the classical contralateral adductor; that is to say, stimulation of one patellar tendon gives an adductor response of the opposite side much more frequently than it gives a homolateral adductor response. This response is relatively infrequent except in pathological cases.

3. A group where the relationship of the homolateral and contralateral adductors cannot be said to have a constant ratio; that is to say, sometimes one finds the contralaterals more lively and at other times the homolaterals. The sites of stimulation for this group are: —

(*a*) The external surface of the knee joint, which gives a response about as often as does the patellar tendon.

(*b*) The anterior-superior spine. This response, I find, is somewhat more frequent than that elicited from the external condyle and the patellar tendon. In my previous paper I placed this group with the second; that is to say, I stated that the contralaterals were more frequently and more easily elicited than the

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homolaterals. Experience has amended this into the statement above made.

Summarizing the order of frequency of these responses, it is roughly put as follows: first, that from the internal condyle; second, that from the middle of the shaft of the tibia; third, the contralateral adductor from the sole of the foot; fourth, the one from the Achilles tendon; fifth, and occurring about as frequently as the fourth, that from the internal malleolus; sixth, the responses elicited from the anterior-superior spine; seventh, that elicited from the patellar tendon, the classical contralateral adductor response; eighth, and about equal in frequency with the above, the response elicited from the external condyle, the external surface of the head of the tibia.

Relationship to Other Reflexes.

A. *Relationship to the Knee Jerk.* — In a general way it may be stated that these responses parallel in activity the knee jerk; that is to say, they appear under conditions in which the knee jerk is increased. However, this parallelism in frequency is but a rough one, for there are conditions in which very active knee jerks are not accompanied by prominent adductors, and especially are not accompanied by the appearance of the contralateral adductors; that is to say, the appearance of the adductor responses, especially the contralaterals, presupposes active knee jerks, but the reverse relationship does not obtain.

The above relationship must be elaborated upon in order to meet the facts in the case. *The important factor in this parallelism is the activity of the knee jerk on the side of the responding adductor, not on the side of the surface stimulated;* that is to say, in the homolateral adductors the side stimulated and the side responding being the same, the adductors and the knee jerk will have a direct parallelism. In the contralateral adductors, the side stimulated and the side responding being different, the important fact is the activity of the knee jerk on the side responding. Marinesco,[14] Marie [13] and I [17] have described cases in which, with the knee jerk absent on one side, stimulation of that side, even from the patellar tendon itself, produced lively adductor responses on the opposite side, whereas, of course, there were no adductor responses on the side stimulated.

It is not to be understood that because of this relationship there is some causal dependency of the adductor responses upon

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the knee jerk. In fact, the relationship may well be one of coincidence. Up to the present time, however, I have never observed a case, where, with the knee jerk absent on one side, any adductor responses could be elicited from that side.

B. *Relationship to the Ankle Jerk.* — These responses have no relationship whatever to the activity of the ankle jerk; that is to say, they may be lively with the ankle jerks lively, they may be absent when the ankle jerks are absent, but, on the contrary, they may be present when the ankle jerks are absent, and absent when the ankle jerks are present. All possibilities are obtainable. In fact, and especially in cases of early tabes, with lively knee jerks and absent Achilles, homolateral and contralateral adductors may be elicited even from the Achilles tendon itself; that is to say, the site of a tendon reflex will give an adductor reflex even when the tendon response is absent.

C. *Relationship to Babinski, Oppenheim and Gordon Signs.* — The adductor responses bear no definite relationship to these. In this they are not different from the knee jerk, which, as is well known, may be markedly diminished when these signs are present; as, for example, in compression of the cord from Pott's disease.

D. The above applies to the relationship to ankle clonus. Summarizing the above statements, the adductor responses have, in my experience, appeared only when a knee jerk was obtainable on the side of the adductor responding. These responses are independent of the knee jerk of the side stimulated, but are directly dependent upon the knee jerk of the side responding. Of course, when the side stimulated and the side responding are the same, they are then dependent upon the knee jerk of the side stimulated. The above relationship is understood to be probably coincidental and not causal. These responses are independent of the Achilles reflex, and also of Babinski, Oppenheim and Gordon signs, as well as ankle clonus.

Incidence in Health.

In my first paper [16] I detailed the proportionate appearance of these reflexes in healthy subjects, the group studied at that time being the members of the first and second year classes in the St. Louis University Medical School. Further experience with normal subjects has led to the following conclusions: adductor responses are not prominent in young and healthy adults. The homolateral adductors from the internal condyle

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and middle of the shaft appear in a very moderate degree in a considerable percentage of normal young men. (It is obvious that normal young women subjects are not easily accessible for research reflex studies. However, it is unlikely that there is any marked difference between the sexes.) A contralateral adductor of very moderate activity from the sole of the foot appears in a somewhat smaller percentage of normal subjects. Bertolotti and Volabra found this reflex present in about 45 per cent. of normal subjects. As they used the hammer of Dejerine, and, moreover, since their subjects were picked from a clinic, the disparity between their results and mine, of about 15 per cent., is not difficult to explain. Sick people, that is to say, persons presenting themselves at a clinic, no matter for what trouble, are not to be classed as normal persons, and the hammer of Dejerine is a heavy hammer, not to be compared with the Taylor instrument. Contralateral adductors from the knee joint, from the external condyle, and the anterior-superior spine did not appear among normal young men. It is true that three of the students examined gave these responses, but further examination showed that these young men could not be called normal. The homolateral adductor from the Achilles tendon appears occasionally in healthy subjects; the contralateral from the same source almost never.

It is necessary at this point to emphasize the fact that the term "normal subject" has been misused by some of the authors. For example, Hinsdale and Taylor in their work on the contralateral adductor from the patellar tendon used as subjects patients presenting themselves at a nerve clinic. It is true that care was taken to rule out organic disease, but nevertheless persons suffering from neurasthenia, "angst-neurosis" and chorea are not normal persons. Even when examining people outside of a clinic a complete physical examination is necessary in order to insure in so far as is possible that one is dealing with healthy persons. In the above-mentioned study of the medical students of St. Louis University, heart and lungs were examined, pupils were tested, and all the common neurological signs were investigated in order to insure normality.

Summarizing, the only adductors presenting themselves in health are those from the internal condyle, the middle of the shaft of the tibia, the contralateral from the sole of the foot, and homolateral response from the Achilles tendon. These are present in a relatively small percentage, and are not marked in activity, nor are the reflexogenous zones from which they are elicited broad.

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These are, as a rule, usually sharply circumscribed. The responses from the external condyle, the anterior-superior spine, and the patellar tendon are not found in normal subjects.

Incidence in Infancy.

This question I wish to leave for the time without very definite statement. In sick infants, that is to say, in babies suffering from malnutrition and from acute infections, contralateral adductors are frequent. It is obvious that there is great difficulty in exactly testing reflexes in infants, but in sick babies stimulation of one side will often cause a movement towards the middle line of the other leg, which, of course, is very good evidence of an adductor response. Concerning normal infants, my experience has not been sufficient to allow of any statement. In children above the age of one year and older the adductors are no more prominent than in adults.

Incidence in Fatigue.

This important question was studied in the following manner: Twenty young men competing in the St. Louis marathon race of May, 1912, were examined on the night before the race and immediately after they reached the clubhouse upon the completion of their 26-mile run. It is obvious that these men were, therefore, examined at two different periods: first, when their muscular efficiency was at its height, that is to say, just before the race, when each man was trained up to his best efforts. That these men were fit and not overtrained is evidenced by the fact that seventeen of them finished in fairly good condition after 26 miles of running along miserable roads and in a heat of nearly 90 degrees Fahrenheit. Second, they were examined at a period of most complete fatigue, that is to say, immediately after they reached the clubhouse at the conclusion of the run.

A. *The Adductor Reflexes in Athletes at the Conclusion of Training.* — No contralateral adductor appeared except in two cases when that from the sole of the foot was elicited. Homolateral adductors were present in five cases from the internal condyle and the middle of the shaft of the tibia. In all the other cases no adductor response of any kind was elicited. Moreover, the knee jerks and ankle jerks were only moderately active in the great majority of the men.

B. *The Adductor Responses under Conditions of Complete Fatigue.* — At the conclusion of the run seventeen of the men, that

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is, those who finished, were examined. Of these none showed any adductor responses whatever. That is to say, complete muscular fatigue caused the disappearance of the responses. In accord with all other observers who examined men doing similar work, I found that the knee jerks and ankle jerks were markedly diminished.

The above facts are very important. It will be shown later that in certain so-called functional diseases, where fatigue is considered by many to play a part, the adductor responses are lively. It is obvious, then, that such fatigue must be entirely different from that caused by intense muscular work, since in the latter case the adductor responses disappear.

Incidence in Disease.

In a general way it may be stated that disease or affection of the upper or cortical motor neuron is, in the organic diseases, a necessary condition for the appearance of the adductor responses. The type of cases most frequently seen in institutions for the insane has necessarily been given the greatest attention, since the greater part of the work done by me has been in such institutions.

A. *General Paresis.* — In general paresis the adductor responses are very prominent, *especially in the early stages of the disease.* The majority of uncomplicated cases of general paresis, that is to say, where no degeneration of the posterior columns has occurred, show lively adductor responses, both contralateral and homolateral. This, of course, is parellel with the increase in the knee jerks seen in such cases. In cases of tabo-paresis the knee jerks disappear and so do the adductors. In certain cases the ankle jerks disappear while the knee jerks are still lively, and in such cases the adductors are still present and are lively. There are transition cases in paresis; that is to say, the process in the spinal cord has commenced but has not yet brought about an abolition of the knee jerks, and in such cases the adductor responses may be absent while the knee jerks are still present. Thus it may be stated that in the one great organic psychosis the adductors are a conspicuous feature, at least in certain phases of the disease.

At this point it is logical to consider a condition which many writers have discussed, but which no one, so far as I know, has studied with as much thoroughness as William W. Graves [4] of St. Louis, namely, that of latent syphilis. Graves has shown that

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the chronic syphilitic presents, even in the periods when he complains of no particular symptoms, and before the appearance of tabes or paresis or any marked aortitis, certain physical signs. These signs are pigmentation of the skin, a certain pallor which Graves calls "cachectic pallor" (though I should prefer the term spastic pallor), inequality or irregularity of the pupils, which, however, still react well to light and accommodation; inequality of the reflexes or disparity between one group, say the arm reflexes, and another, the leg reflexes, and certain changes in the cutaneous sensibility, particularly areas of hypalgesia. In such cases the adductor responses are frequently of great liveliness, as I have found in the study of Graves' cases. This, of course, is in line with the belief now entertained that paresis is an extension of chronic syphilis, and in many respects merely represents a further stage of it, not to be differentiated by any such term as parasyphilis.

B. *Incidence in Tabes Dorsalis.* — It can be said without further detail that when the knee jerk has disappeared or is diminished in tabes the adductors disappear. Furthermore, in those occasional cases when the ankle jerks have disappeared but the knee jerks still persist and are lively the adductors may be lively. I have had at least four well-marked cases showing this.

Cerebral Hemorrhage, Thrombus or Embolism causing Hemiplegia: Ganault especially studied the reflexes in this condition, and, in general, my conclusions agree with his as to the incidence of the adductor responses. These conclusions are as follows: on the side of the paralysis, the adductor reflexes are livelier than those on the opposite side, although they may be present and frequently are present on both sides in a manner not found in normal subjects. This, of course, is in accord with the experience that all the reflexes *bilaterally* are increased in hemiplegic conditions. Furthermore, such cases demonstrate in a very remarkable manner the fact that the liveliness of the adductor response is coincident with the liveliness of the knee jerk on the side responding, independent of the site of stimulation.

There exists, however, a complication in hemiplegia which frequently makes the different results seem unwarranted; that is to say, there are many cases of hemiplegia in which the adductor responses on the paralyzed side are apparently absent, while those on the opposite or non-paralyzed side may be lively. *In such cases it will almost invariably be found that there exists contracture of the adductor muscles,* a very common phenomenon

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even in early hemiplegia, and almost invariably present in late hemiplegia, and in part responsible for the gait of the hemiplegic. If the adductor muscle be contracted, that is, exists in a state of chronic activity (if such a term may be used), then further stimulation of it will result in little or no movement according to the degree of contracture; that is, if the muscle by virtue of its contraction up to its limit is incapable of further movement, then no amount of stimulation by tapping the bone on one side or the other will cause movement, and if by virtue of its state of contraction it is capable of only a small amount of movement, then the side free to move, the opposite side, may move more when stimulated. *The adductor contracture in hemiplegia is in itself a phenomenon* to a certain degree similar to that obtained by stimulating the lower extremities, and indeed has a pathological and physiological value similar to that of the adductor responses. In many cases of adductor spasm stimulation of the bones on one side or the other will cause but little visible movement, yet if the hand be placed on the adductors concerned they will be found to contract in a very sharp, somewhat convulsive manner, very much unlike the response found in normal persons.

C. *Incidence in Certain Miscellaneous Organic Diseases.* — 1. Tumors of the Brain: These responses do not seem to be very prominent in those cases which have come to my observation. However, my experience with brain tumors has been rather scanty, and most of the cases have been such where mental symptoms predominated, so that the diagnosis of tumor was not made until after the entrance of the patient into the asylum. Such cases are largely frontal, and consequently the tumor does not exercise a direct effect upon the reflexes except through pressure.

2. Multiple Sclerosis: The adductor responses are very prominent in this condition and frequently approach a clonic state. This, it will be observed, is on a par with the tendon reflexes in general.

3. Compression of the Cord from Tumor and Pott's Disease: Here, the adductor responses follow the same general principles as do the knee jerks; that is to say, are lively when the degree of pressure is slight, and disappear when the reflexes in general are diminished or abolished.

4. Fracture of the Skull: My opportunities for studying these cases have been limited to but four cases. In one of these, with the gradual appearance of pressure symptoms due to a rupture of the middle meningeal artery, the adductor responses on

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the side concerned appeared about the same time as did Babinski sign, and disappeared when, after tying of the artery and rest in bed, the cerebral condition had largely disappeared. In the other three cases the adductor responses were not conspicuous, but in these cases there was no conspicuous change in the knee jerks, and, in fact, in one of these cases there was a general diminution of all responses. A larger experience with this condition would undoubtedly show that there was a coincident relationship between the changes in the knee jerk and the adductor phenomena.

5. Diseases of the Peripheral Motor Neuron: In alcoholic neuritis, of which many cases have been studied, the adductor responses are absent. In anterior poliomyelitis, of which I have studied but a few cases, the adductors disappear when the lumbar cord has been affected.

Functional Psychoses.

A. In dementia præcox a certain number show moderate homolateral adductors, and occasionally one finds contralateral adductors from the internal condyle, the shaft of the tibia, and occasionally from the patellar tendon. These latter cases are few and I cannot explain them. In general, in dementia præcox the adductor responses are not conspicuous.

B. The above is true of manic-depressive insanity. There is an irregularity in the liveliness of the responses in this condition; that is to say, some cases present lively reflexes and others moderately active reflexes. The adductor responses vary in the same way as do the knee jerks in this condition, but it must be stated that both in dementia præcox and manic depressive there are many cases with knee jerks that in point of liveliness approach those elicited in general paresis, and yet in these cases the adductor responses very frequently are only moderate and rarely excessive; that is to say, in the functional psychoses and in the functional neuroses many cases of lively tendon reflexes are not accompanied by lively adductors. This form of disassociation is found much more often in the "functional diseases" than in the organic.

C. *Senile Dementia.* — This term is so loosely used in the asylums in general that no one single group of cases is concerned. Frequently the term is used to cover a rather extreme degree of the normal childishness, forgetfulness and helplessness of old age. Sometimes it is used when arteriosclerotic insanity is revealed by autopsy, and it also includes that group of delusional,

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hallucinatory states for which the term had better be reserved. Such being the case the discrepancy in the adductor responses found in the condition so labeled must be left open as to causation. In general, it has seemed to me that those cases in which the arteriosclerotic disease was evident, even when no hemiplegia was directly concerned, presented lively adductor responses in a far greater percentage of cases than did those presenting merely the childishness and helplessness of old age. In other words, old age in itself was not responsible for the appearance of the adductors, but cerebral arteriosclerotic changes were. Those senile delusional states that were not associated with cerebral arteriosclerosis, in general, did not seem to give undue adductor responses.

Functional Neuroses.

A. *Hysteria.* — In hysteria, as is well known, the knee jerks are very frequently extremely lively, and indeed often accompanied by what seems to be movement of the whole body. Nevertheless, as has been pointed out, the response is rarely of a spastic kind, and presents certain differences, perhaps discernible only to the experienced, from that found in organic disease. In hysteria the adductor responses are more frequent than they are in the normal person, but rarely approach the condition found in paresis. The homolaterals are frequently lively, but in such cases there is more of a movement of the leg and less visible contraction of the muscle itself; that is to say, there seems to be something of a *voluntary effort to move the leg inward* rather than an *isolated, quick, sharp contraction* of the adductor group of muscles such as is found in the organic diseases. The contralaterals are not so conspicuous, though occasionally there is seen the same movement as that described above, — a movement which suggests voluntary innervation of the adductors.

B. *Neurasthenia.* — What has been said of hysteria is, to a large extent, true of neurasthenia except with the following reservations: —

1. There is a group of cases usually classed under neurasthenia in which the reflexes are rather inactive. These cases, it seems to me, belong to true fatigue states, especially caused by overwork of a physical kind. In such cases the adductor responses are not prominent.

2. In the true neurasthenic conditions the reflex responses are usually very active. These conditions are usually marked by worry, fatigue, visceral symptoms, tremors, feelings of inaptitude,

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failure, etc. In a mild degree they are frequently seen among those whose work is largely cerebral, and whose strain is largely mental. In such conditions the reflexes are usually exaggerated, and in such cases the adductor responses are relatively common. However, the contralateral responses from the Achilles tendon, from the patellar tendon, the condyle and the anterior-superior spine are almost never found. When they exist some other condition should be suspected, such as incipient general paresis, which is often mistaken for neurasthenia, latent syphilis, hyperthyroidism, etc. As a result of my experience, *I believe that the adductor responses, whether homolateral or contralateral, elicited from the patellar tendon, the anterior-superior spine, and the external condyle practically exclude neurasthenia as a diagnosis.* There may be neurasthenia present in such cases, but there is some other organic condition also present.

There are many questions as to the physiology and pathogenesis of these responses that need answering. Of these only a few will be dealt with in this paper. The questions to be considered may be arranged as follows: —

1. What is the bearing of these responses upon Pflüger's [20] classical laws concerning the sort of reflexes? The answer is *that if these responses are to be regarded as reflexes* then they controvert his views.

(*a*) The law of homonymous conduction for unilateral reflexes (that is, if a stimulus applied to one side causes movement only on one side that movement will be on the side of stimulation) is contradicted by the contralateral from the sole of the foot, which frequently is the only response.

(*b*) The law of bilateral symmetry (that is, a response elicited by stimulation of one side, when it spreads further and to the opposite side awakens only the symmetrical mechanisms) is contradicted by the contralateral adductor elicited from the patellar tendon. Here one gets a knee jerk on the homolateral side with a contralateral adductor, but no contralateral knee jerk.

(*c*) The law of unequal intensity of bilateral reflexes (that is, if bilateral muscular response is elicited by unilateral stimulation the homolateral response is greater) is contradicted by the contralateral from the sole, from the patellar tendon, and occasionally by those from the external condyle and the anterior-superior spine.

Sherrington,[22] after pointing out that these "laws" did not obtain in animals, says very pertinently "that these so-called

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laws of reflex irradiation were so generally accepted as to obtain an eminence which they hardly merit."

2. What is the essential difference between adductor responses and the tendon reflexes? The main difference lies in the far wider zone of elicitation, and this difference is so marked in degree as seemingly to constitute a difference in kind. It is only occasionally (Cohn) that a knee jerk can be elicited in any site far distant from the patellar tendon, and so far as I know it is never bilateral from unilateral stimulation. The Achilles reflex can be elicited from the sole of the foot (Graves), but this is merely another way of stretching the Achilles tendon, while the adductors are elicitable by the stimulation of many areas and are often contralateral and bilateral. In this they resemble a contralateral periosteal arm reflex which I have described as occasionally elicited from the clavicle, and which is also adductor in its nature. In other words, the adductor type of response elicited from bones is not directly dependent, at least, upon any segmental relationship of the sensory surface stimulated; it seems, on the whole, to be selective in that it occurs far more frequently than other types of response, and is frequently contralateral and bilateral.

These adductor responses present another point of difference from the tendon reflexes in that they are not so constant in health, and, in fact, most of the contralateral and bilateral reflexes appear only in disease, either organic or functional. This gives them a value which, while not in any sense replacing the tendon responses, supplements their value.

3. What is the relationship of these responses to mechanical vibration of the pelvis? This has been a moot question in the discussions concerning them. For many of the authors the adductor responses are due merely to the stimulation by vibration of the pelvis. Others have stoutly contradicted this view. For example, Bertolotti [1] and Volabra in their consideration of the causation of the response called it merely mechanical, and said the crossed reflexes are best obtained in a position which permits a greater disturbance of pelvis and spinal column, whereas Risien-Russell,[21] Hinsdale [5] and Taylor by manœuvers which eliminated the jar of the pelvis as much as possible, still obtain these responses. Without entering any further into the history of the discussion here follow some observations which have a tentative bearing upon the direct causation.

(*a*) The homolateral responses are best elicited by blows which,

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on the whole, are directed outward. Take, for example, the internal condylar, the middle tibial and the Achilles sites of stimulation. From these points the contralateral is a less frequent phenomenon, and one present only with great activity of the homolateral response.

(*b*) The contralateral is best elicited from sites where the blow is directed upward and inward; for example, the sole of the foot and the patellar tendon in the position described in this paper. From these sites the homolaterals are less frequent and less lively.

(*c*) From the external condyle, where the blow is directed inward, and the anterior-superior spine, where the blow is directed inward and downward, the predominance of one or the other adductor responses cannot be determined. This fact, that the direction of the blow has very much to do with the type of response, makes it seem possible that the stimulation which brings about the adductor response is indirect in its application. For the present I wish to state that I believe that the *real afferent limb of the arc arises either at the hip or in the pelvis, and not at any one of the sites stimulated.* This receives some proof, so far as the last part of the statement is concerned, in the fact that with an absent knee jerk or ankle jerk, stimulation of the patellar tendon or the Achilles tendon may bring about adductor responses. It receives at least additional standing as to value when one considers the meaning of the adductor responses.

4. What is the meaning of the adductor responses? It is necessary here to consider first two other matters which bear upon the subject. First, the question of contracture following, for example, hemiplegia. In this, as is well known, the arms usually take a flexor attitude, the legs usually take an extensor attitude. It is not generally appreciated that in the case of the legs the contracture in the adductor muscles appears early and is a prominent symptom. Indeed, in certain conditions, such as, for example, Little's disease, where the lesion is bilateral, the scissors gait is a common phenomenon, and the scissors gait is nothing more or less than an overwhelming contracture of the adductor muscles. Likewise, in primary lateral sclerosis there is some tendency, though not to so marked a degree; that is to say, in the leg two groups of muscles contract, and these are the extensors and the adductors. This contracture has received various explanations. The earliest theory advanced by Charcot was that the sclerosis in the pyramidal tract was responsible. This, of

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course, is now completely discarded, and the general opinion held is that with the influences of the cerebrum gone other influences which play particularly upon the groups of muscles contracting begin to be felt. For Hughlings Jackson,[9] Luciani, Lewandowski [12] and others the cerebellum entered into the situation and caused contractures by playing unopposed upon these certain groups of muscles. For others, such as Hitzig, von Monakow [15] and Oppenheim,[19] the contracture is produced by the influence of the sensory impulses upon the lower system. This latter explanation seems very unsatisfactory to me in view of the fact that when two groups of muscles are affected in cerebral injuries one loses function and the other enters into a state of enhanced and unopposed function. This would make it seem likely at least that the cerebral injury brought paralysis to one group of muscles and permitted unopposed the influence of some other center upon the other group. Sherrington [22] finds in the nerves of the otic labyrinth, "tonus labyrinth of Ewald," and in the afferent nerves of muscles the sources of the influence which Hughlings Jackson refers to the cerebellum. In general, Sherrington stands in accord that in these cases of hemiplegic contracture and the like the cerebrum loses control of one group of muscles, the so-called phasic group, while another group, the so-called tonic group, comes under the unopposed influence of other nervous centers. At this point it is necessary to consider Sherrington's views as to the distribution of tonus. The common opinion expressed is that tonus exists in all muscles during life. For Sherrington the contraction of one member of a pair of muscles is accompanied by the inhibition of the tonus of its antagonist. Further, he believes "the selective distribution of the jerk phenomena under the ordinary conditions employed for their elicitation to single members of antagonistic couples, for example, gluteus, crureus, masseter, and their absence under those conditions from the opposite members of the couples, is suggestive that under the condition taken, *reflex tonus may be confined to one member of an antagonistic pair, namely, to that member which is then in reflex tonic operation; e.g., counteracting gravity for the preservation of an habitual pose of the animal.*"

It is upon this last statement that I wish to lay emphasis, — the habitual pose of the animal. In man, in his habitual pose, the muscles which counteract gravity, so far as the lower limbs are concerned, are the extensor muscles and the adductors. These constitute the tonic groups, whereas the other muscles are the

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phasic groups; that is to say, these latter change the position from moment to moment, while the former groups tend to maintain the habitual position and are in constant action. As Sherrington points out, it is the phasic group of muscles which is paralyzed in cerebral injury, whereas the tonic group is increased in tonus, and this causes the phenomena of the increased reflexes.

Second, one may here consider the decerebrated animal of Sherrington. The decerebrated animal, especially if placed in a position where gravity exerts its influence to the best advantage, takes a position very much like the hemiplegic contracture; that is to say, there ensues a pose which is largely extensor so far as the lower limbs and tail are concerned. Sherrington does not mention the condition of the adductor muscles in these animals, but it is unlikely that the adductors would play so important a part in maintaining the pose of an animal as they do in the case of man.

The opinion is advanced tentatively that *the adductor responses belong to the tonic responses of muscles habitually maintained in tonus by some influence other than the cerebrum; that in health this tonus being less important for the preservation of attitude than the tonus of the extensor group of muscles, is not to any great extent demonstrable as the adductor response, but that in disease of various kinds, having as their general feature either the functional or the organic injury to the cerebrum, these responses become manifest in the manner described.*

Résume.

1. The adductor responses are present in health as mild and occasional homolateral and contralateral responses from sites described above.

2. Fatigue does not increase them, but diminishes them to the point of abolition.

3. The appearance of contralateral adductor responses, especially from the patellar tendon, the external condyle, the anterior-superior spine and to a lesser degree from the Achilles tendon, is a phenomenon of disease, not necessarily organic, but usually such.

4. These responses bear at least a coincidental relationship to the knee jerk of the side responding, and have no apparent relationship to the knee jerk of the side stimulated or to the Achilles tendon of either side.

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5. The site of stimulation is probably not so important as the direction of the blow and the resultant stimulation of either hip joint or pelvis, and that the part thus indirectly stimulated (either hip joint or pelvis) acts as the afferent limb of the reflexor whose motor limb stimulates the adductors.

6. The adductor muscles probably belong to the tonic group of muscles; that is to say, those muscles innervated in the greater part, though not completely, by influences other than the cerebrum, and that with the disappearance or diminution of the cerebral influence the tonus of these muscles is so increased that their reflex activity becomes greatly enhanced, resulting in the phenomena herein described, that is, the homolateral and contralateral adductor responses.

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PATHOLOGICAL FINDINGS IN THE SYMPATHETIC NERVOUS SYSTEM IN THE PSYCHOSES.*

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In contrast with the immense importance ascribed to the sympathetic nervous system, and the unremitting study it has received on the part of physiologists, neurologists and clinicians, is the attention that it has received on the part of pathologists. Except for the work done in Addison's disease, the literature contains but a very few scattered pathological studies of the subject. Compared with what has been done by the neuropathologists on the central nervous system, that done on the sympathetic sinks into complete and astonishing insignificance.

1. Some of the More Important Literature.

One of the most quoted as well as one of the earliest pathological studies was that by Hale White.[16] Working entirely on material from non-insane patients, White found that the semilunar and the superior cervical ganglia quite regularly presented changes of marked character. Pigmentation that went on to the destruction or disintegration of the cell, disappearance of the nucleus, absence of the nerve processes, appearance of leucocytes without regard to pathological processes, increased connective tissue, — these he records as occurring in most cases after early adult life. They were not present in ganglia of children. As a result of his pathological studies and of a study of the sympathetic ganglia in animals, White came to the following conclusions: First, the changes above described, occurring in the semilunar and the superior cervical sympathetic ganglia, are *not pathological*, but represent a *normal change* occurring in the life history of the ganglia. When such changes occur in the thoracic ganglia they are of some pathological importance. When they occur in the Gasserian ganglion (used as a control), in the cardiac and lenticular ganglia, they are of great pathological importance, representing then a disease process. Second, studies in animals convinced him that the semilunar ganglion, as well as the superior cervical,

* Read before the Boston Society of Psychiatry and Neurology, Dec. 23, 1915. Taunton State Hospital Paper, 1916, No. 1.

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is a *recessive organ, one which tends to disappear as one goes higher in the animal scale, and without function in the adult human.* It has function in the child, and therefore may be compared, on the ground of life history, with the thymus. On the other hand, the lenticular, cardiac and Gasserian ganglia are of decided importance because they functionate in the adult, and changes occurring in them are of pathological importance. Somewhere between these two series of ganglia are the thoracic ganglia of the sympathetic, which in part are recessive and in part functional.

It is important to note that this view is absolutely opposed to the belief that the semilunar ganglion is a *very active nervous organ* having the closest relationship with the condition of the abdominal and pelvic viscera, entertained by the later physiologists, neurologists and clinicians (Eppinger and Hess[4]; Langley, Onuf and Collins,[13] Higier[5]). Moreover, the biological studies of White are distinctly contradicted by the researches of His, Jr., and especially by the work of Kuntz.[6] According to the latter the semilunar ganglion is a *late* organ, one that is phylogenetically younger than the central nervous system, and younger than the peripheral ganglia of which it is an outgrowth. The higher up in the animal scale the more this prevertebral system comes into play. Consequently, it is by no means a recessive organ, but, on the other hand, is an *arriving* organ.

It is pertinent to state here that some facts which are the result of personal research contradict White's views; for example, in the semilunar sympathetic in old people one finds cells with very good cell processes (Fig. 1, Plate III). Moreover, acute cell changes of a type occurring only in functioning cells occur in the sympathetic ganglia of old people (Fig. 2, Plate I, cells A and B).

Vas,[15] somewhat later, believed that the excessive pigmentation found in the sympathetic was not entirely pathological, and in a large part represents the normal evolution of the nerve cell.

With both of the above opinions, that is, those of White and of Vas, Lugaro[11] is in disagreement. Conceding that pigmentation is a process of old age, its *excess* as found in cachexia and in other conditions indicates *excessive senility, true disordered function.* For Lugaro, the frequent finding of excessive pigmentation, cell destruction, nuclear changes and connective tissue increase in old age can be correlated with the physical disturbances of that time of life. He concludes that the superior cervical ganglion and the semilunar are *earliest* of all the sympa-

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thetic ganglia *to become aged.* It will thus be seen that of the two conclusions possible concerning these changes, which are, first, that it is a normal evolution, and second, that it is an early senility, White has taken the one view and Lugaro the other.

Orth[14] finds increased pigment, atrophy of cells and a disappearance of the nucleus in cachexia and extreme old age.

Most of the other writers on the sympathetic, as studied from a pathologist's point of view, have paid their attention to the cells found in the intestine and heart. Thus Blaschko,[1] working in enteritis, finds acute cell changes in Auerbach's plexus, and suggests that diarrhea accompanying enteritis is a nervous phenomenon. The researches of Leupold[9] substantiate a similar conclusion. Cotton and Southard[3] find axonal reaction changes in a case of mental disease in which this reaction was found widely spread throughout the central nervous system, thus making up the pathological entity called central neuritis by Adolf Meyer. Of great importance are the degenerative changes recorded by Lissauer[10] as occurring in the heart ganglionic cells after acute and chronic alcohol and chloroform poisoning, as well as through disease.

The views of Y. Manquelian[12] are of decided interest. On the ground that he has demonstrated sympathetic nervous cells in the aorta and in many of the organs, he believes that the interpretation of bodily symptoms without reckoning the peripheral nervous system is vitiated by the omission. Glandular activities and disease processes are affected by and affect the nerve cells scattered throughout the body.

2. Personal Studies.

The material examined was in part obtained from 50 consecutive autopsies performed at the Taunton State Hospital during the past year. In the main, only the semilunar ganglia were studied, usually from formalin, zenker and alcohol-fixed material. The stains mostly used were eosin-methylene blue, Van Gieson, toluidin blue and cresyl violette, Bielschowsky and scharlach R. In addition to the above material, 40 sets of slides from as many cases autopsied at Worcester State Hospital during 1903 and 1904 were restrained in the eosin-methylene blue and examined. Furthermore, certain animal material was sectioned, and results will be here recorded.

It is not my intention to describe every variety of change

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found. Certain outstanding and peculiar variations will be considered, not in relation to mental syndromes, for no such relationship can at present be even considered, but in wider relationships.

1. *Brief Description of the Normal Semilunar Ganglion Cell.* — It is a multipolar cell with a large, slightly eccentric nucleus of ordinary structure. The Nissl granules are not so distinct as, for example, in the Gasserian ganglion or in the motor cells of the cord, but they are readily demonstrable and are not peculiar. The cell is smaller than the Gasserian ganglion cell, but is like it and all peripheral cells in that it lies in a capsule lined by endothelial cells. These cells have the usual satellite functions and line each process of the cell as well as its body.

Cells having a double nucleus are comparatively common in the semilunar ganglion. The meaning of such cells is debatable in other parts of the nervous system, but in the semilunar ganglion it is undoubtedly normal, and in certain species of animals (the rabbit, the guinea pig) it is extremely common. In man such cells differ in no other fundamentals from their neighbors. Both in man and the animals the double nucleated cells are not found in the intestine or other peripheral organs. (Carpenter and Pinil.[2])

A peculiar phenomenon which is here mentioned, perhaps irrelevantly, is the occurrence, though very uncommonly, of cells having double nucleoli. These double nucleoli have almost, though not quite, the appearance of mitosis. Double nucleoli are fairly common in the sympathetic ganglion cells of certain animals; for example, rabbit, guinea pig and, by personal observation, in the intestine of a bull (Fig. 1, Plate II, cell B). Whether it is pathological in man I cannot say. It was found only in a few cells of a young epileptic and in a senile dementia case, a man aged ninety-five.

2. *Axonal Reaction.* — So far as I know, this has not previously been described in the cells of the semilunar ganglion. Here, as elsewhere, there is a displacement of the nucleus to the periphery, a swelling of the body with central chromatolysis, and in some cases the nucleus is extruded. The meaning of this phenomenon is well established, and relates to an acute disorder which may or may not arise through injury or irritation of the axon. This phenomenon occurring in isolated cells in very many cases was particularly prominent in five (Fig. 2, Plate I).

(*a*) An acute exhaustion psychosis in a woman of fifty, without acute infection, and terminating in death owing to failure

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of compensation of the heart, of which the mitral valve was chronically diseased.

(*b*) Three cases of enteritis ending in death. In these cases, occurring twice in senile dementia and once in general paresis, the axonal reaction was very prominent in cells scattered throughout the ganglia.

(*c*) One case of senile dementia, more properly a psychosis due to failure of compensation and cerebral arteriosclerosis, in a male aged sixty-eight, who died of pulmonary tuberculosis; tubercular glands of peritoneum, no tuberculosis of sympathetic. Very decided axonal reaction throughout the ganglia, together with much more chronic changes later described.

3. *Emigration of the Nucleolus.* — This rare change, probably acute in character, is here described, I believe, for the first time. As the name indicates, the nucleolus leaves the cell to disappear into the interstitial tissues. Eccentricity of the nucleolus is not uncommon. The meaning of this phenomenon is unknown. It was prominent in a senile dementia case, man of ninety-five years of age (Fig. 1).

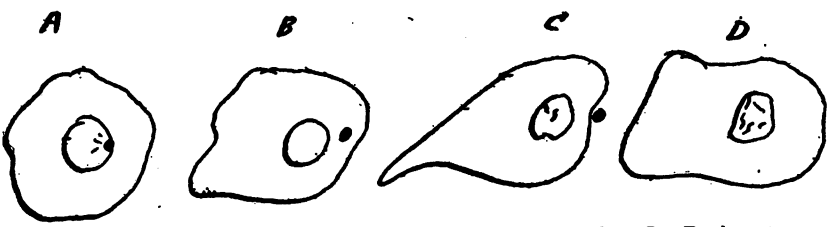

FIG. 1. — Showing emigration of nucleolus. *A* — Eccentric nucleolus. *B* — Further stage. *C* — Nucleolus, entirely out. *D* — Cell without nucleolus.

4. *Neurathrepsia.* — This term is here used to cover a very large number of changes of a chronic type which lead to the destruction of the cell. It was first used by Levaditti,[7,8] and is in contrast with the term *neuronphagia*, which, properly used, means the "eating up" of the nerve cells by phagocyte and satellite cells as seen in anterior poliomyelitis and rabies. In neurathrepsia, owing to defective metabolism, there is progressive change in the nerve cells with or without corresponding increase in the satellite cells. As Van Gehuchten pointed out years ago, if degenerative changes are slow, satellite cells do not multiply. If the changes are rapid they do multiply.

Pigmentation, type No. 1: The usual lipochrome is common in the sympathetic. It appears early, frequently starts around the nucleus, and in the sympathetic is very often excessive to

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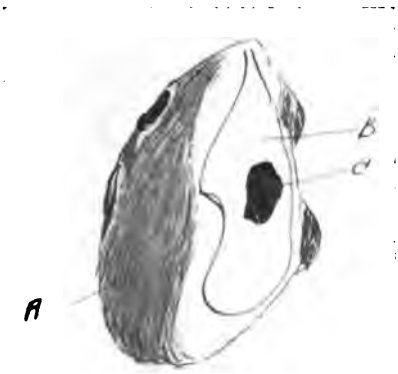

FIG. 2.—Showing shrinking of nerve cell and intra-capsular homogeneous red-staining mass (epileptic dementia). *A*—Intra-capsular mass. *B*—Shrunken nerve cell. *C* — Nucleus, presenting hyperchromatia.

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the point where no cell structure can be made out and where masses of pigment only can be seen. In such cells, by Bielschowsky's neurofibril method, the cell processes are difficult to make out and the fibrils cannot be distinguished. In cachexia, and especially (as it seems to me) where the intestinal atrophy is marked, the largest part of the cells present have no nuclei, and are represented by irregular groups of pigment without cellular structure (Fig. 2, Plate III).

Type No. 2: Oxyphilic granules, that is, granules which take the acid stains, such as the eosin-methylene blue, are prominent in the process here described. These granules, called oxyneutrophylic by Marinesco, are frequently found together with the lipochrome and independently of it. The granules are very often very fine and scattered, and, on the other hand, are seen as large granules which are quite compactly arranged. These granules are much more common in the prevertebral than in the central nervous system, and occur more frequently in the semilunar than in the Gasserian ganglion. They represent undoubtedly pathological changes of a chronic kind. It is certain, however, that they also occur in more acute conditions. In a young bull suffering from tubercular enteritis certain cells of Meissner's plexus in the intestines show this change in decided manner (Fig. 1, Plate II).

5. *Nuclear Changes.* — These are exceedingly common in this condition. Viewed from the technical standpoint they consist in a gradually increasing affinity for acid dyes, so that while the normal nucleus is unstained in eosin-methylene blue preparations, the abnormal in the final stage may be of a deep red. Morphologically, the nucleus presents first an irregular border and then becomes more and more shrunken until in extreme cases it has a half-moon shape. Filamentous change of the nucleoplasm is part of the process. Finally, it must again be mentioned that in marked pigmented neurothrepsia the nucleus disappears from the cell structure. This, however, is not so common as most of the writers seem to think, and it is possible that they may have been misled by the fact that the irregular arrangement of the sympathetic ganglion cells lends itself to deceptive planes of section in which no nuclei can be found.

6. *Capsular Changes.* — In the old, where the degenerative changes progress to a marked extent, one of the most apparent phenomena is the irregular relation between the capsular nuclei and the nerve cells (Fig. 2, Plate III). In the young, this ar-

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rangement is very regular. In the old, the capsular nuclei are increased, swollen and overlie the nerve cell. Where the cell is completely destroyed there is usually a definite increase of capsular cells. This multiplication of satellite cells is not so marked, in my opinion, as the corresponding neurogliar increase under similar circumstances in the central nervous system.

In certain old cases, especially marked in a case of epileptic dementia in a man seventy-five years of age, the nerve cells are decidedly irregular and shrunken in appearance. Under favorable circumstances this is found to be the result of a homogeneous red staining mass which appears in the capsule and, gradually encroaching on the cell, causes an atrophy by pressure (Fig. 2). I have not found this change in the Gasserian ganglion.

7. *The Interstitial Connective Tissue* (Fig. 1, Plate I) shows an increase, as might be expected. One very curious feature of the semilunar ganglion is the almost complete absence of true, inflammatory reaction processes. Plasma cells, even in general paresis, are practically never seen, and the entire lymphocytic and leucocytic series are conspicuously absent. This in despite of the fact that the ganglia are *surrounded by* and *interspersed with* very small but very active lymph glands of a curious kind in which all manner of cells are found. The paucity of inflammatory reaction is in decided contrast with the condition of two related structures, — first, the central nervous system and the Gasserian ganglion, in which such changes are very common, and second, the adrenal gland, in which lymphocytes, plasma cells, etc., are more often found, perhaps, than in any other non-lymphatic structure of the body.

Scattered through the ganglion, however, are occasional eosinophilic cells of the type found in inflammations. These cells are of two kinds, — one with coarse granules (Fig. 2, Plate II), the other with a nucleus like a plasma cell and a finely granular body. This last type is similar to cells found in the aforementioned lymph glands.

A very suggestive finding is to be recorded in the eosinophilic cells found in an intestine of a young bull killed because of tubercular enteritis. In this case there were many eosinophilic cells, as is normal for this species of animal, and, besides, many plasmas, etc., because of the tubercular inflammatory process. *The curious thing was that the eosinophilic cells seemed actively phagocytic for the injured nerve cells, and selectively so* (Fig. 1, Plate II).

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Since the eosinophiles have never before been seen to be phagocytes, this observation is important.

To summarize the above findings. First, the semilunar ganglion is apparently often acutely injured in general infections and in enteritis, as is shown by the presence of the axonal reaction and other changes above described. Second, the semilunar ganglion is the seat of degenerative processes to an extent probably greater than cord, brain or Gasserian ganglion. These degenerative changes are here designated under the general term neurothrepsia (Levaditti). It is probable that these changes represent an early and marked senility, and in this I am in accord with Lugaro. Third, there is a decided absence of marked reactive changes (lymphocytes, plasma cells, etc.), such as are prominent in the central nervous system, Gasserian ganglion, and the related organ or adrenal. Even in general paresis these are absent. Fourth, there is a curious, though not prominent, increase of eosinophilic connective tissue cells, which, in the case of the bovine tubercular enteritis here cited, seemed to have a phagocytic attraction for injured nerve cells.

It is to be emphasized that the above findings apply, in my experience, only to the psychoses.

Conclusions. — Two prominent conclusions stand out as worthy of emphasis. First, the semilunar and other sympathetic ganglia and the autonomic ganglia merit the close attention of pathologists. The part the vascular and glandular system under their control plays in all the great vital processes, as well as in the creation and modification of the emotions, indicates that a more comprehensive and systematic study may throw light on the problems of old age as well as on the psychoses. Regarding the latter, it may be stated that quantitatively greater changes in the cases of insane people may well have a value equivalent to qualitative changes, since in many of the psychoses the evolution of the disease is from temperament to insanity. Second, the interpretation of morbid phenomena needs to take into account the presence of nerve cells in the organs, such as the aorta, the heart, the intestines, stomach, genitalia, etc. Symptoms may well arise because of injury to these peripheral cells either as an antecedent or as a consequent of the disease process. We have, as recent experiments show, drugs that have a peculiar and selective power on the nerve cells of the autonomic and sympathetic systems. These should be experimentally as well as therapeutically used in conditions where the symptoms are even in part vasomotor and glandular.

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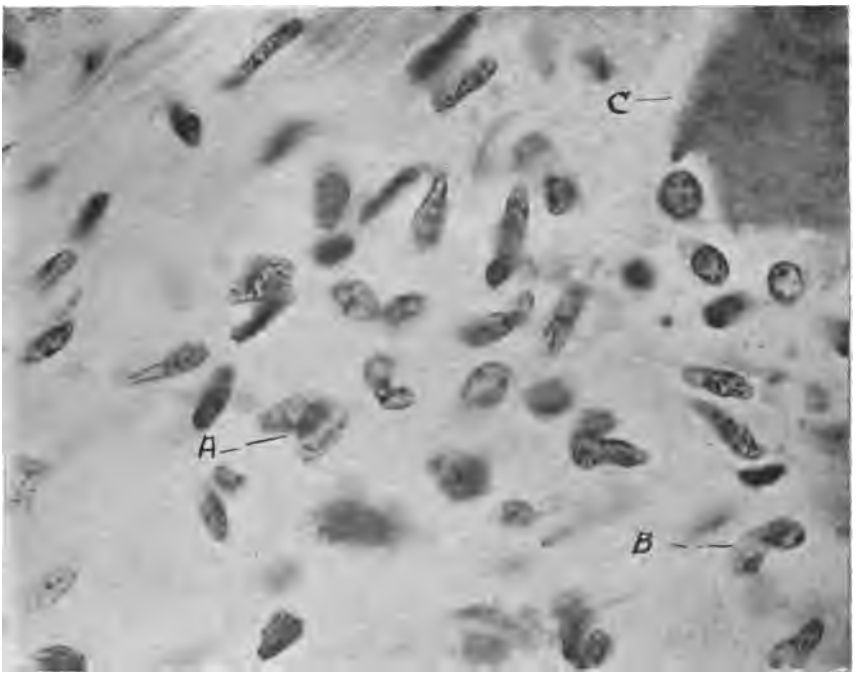

FIG. 1.—Interstitial connective tissue proliferating. Cells *A* and *B*, mitosis. C, nerve cell. × 1000. E. M. Blue.

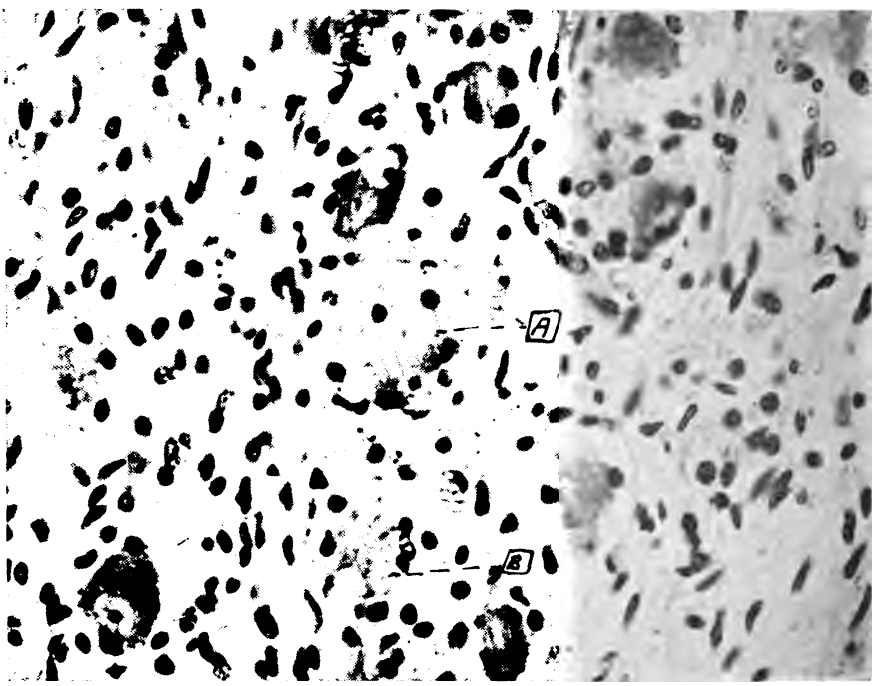

FIG. 2.—Axonal reaction. Cell *A*—Nucleus almost extruded. Cell *B*—Nucleus peripheral. × 340. Cresyl Violet.

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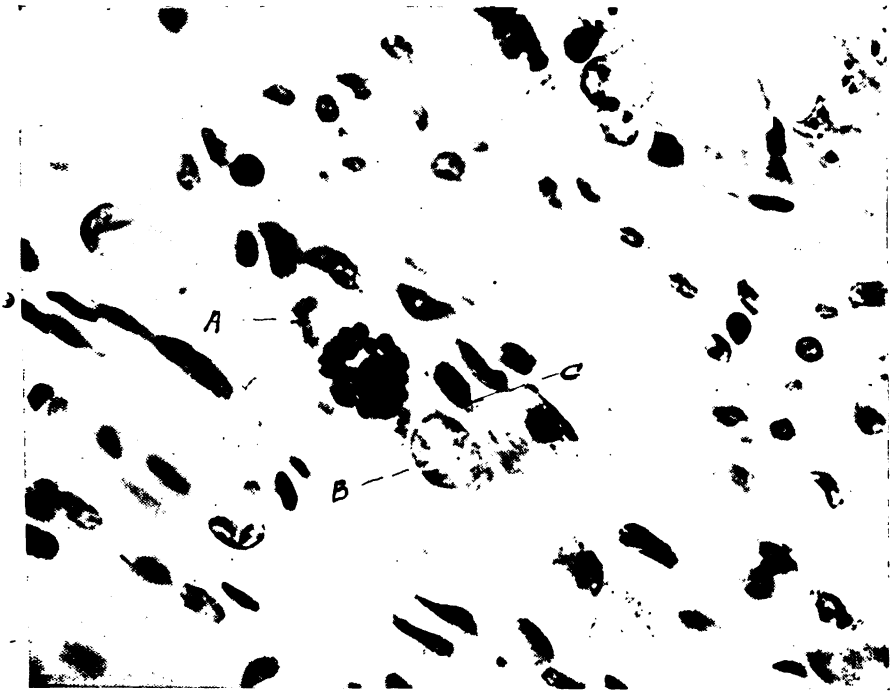

FIG. 1. — Intestine of bull; tubercular enteritis. Cell *A* — Nerve cell, in Meissner's plexus showing large oxyphilic granules. Cell *B* — Swollen nucleus, nerve cell, with two nucleoli. Cell *C* — Eosinophile. × 1000. E. M. Blue.

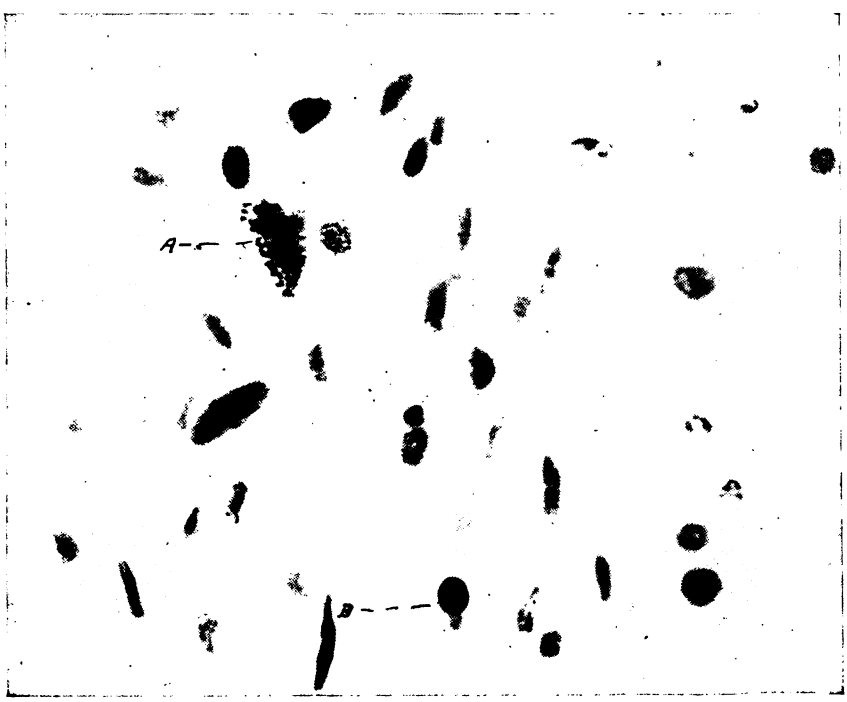

FIG. 2. — Interstitial connective tissue of ganglion. Cell *A* — Eosinophilic reaction cell, with large granules. Cell *B* — Eosinophilic reaction cell, small granules, plasma cell nucleus. × 1000. E. M. Blue.

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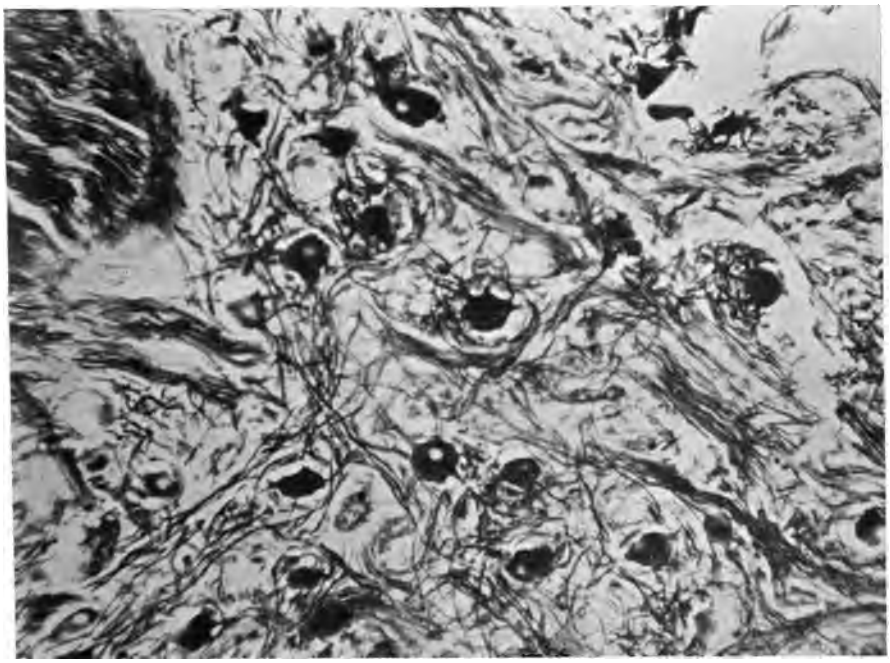

FIG. 1.—Showing multipolar cells. × 140. Bielschowsky.

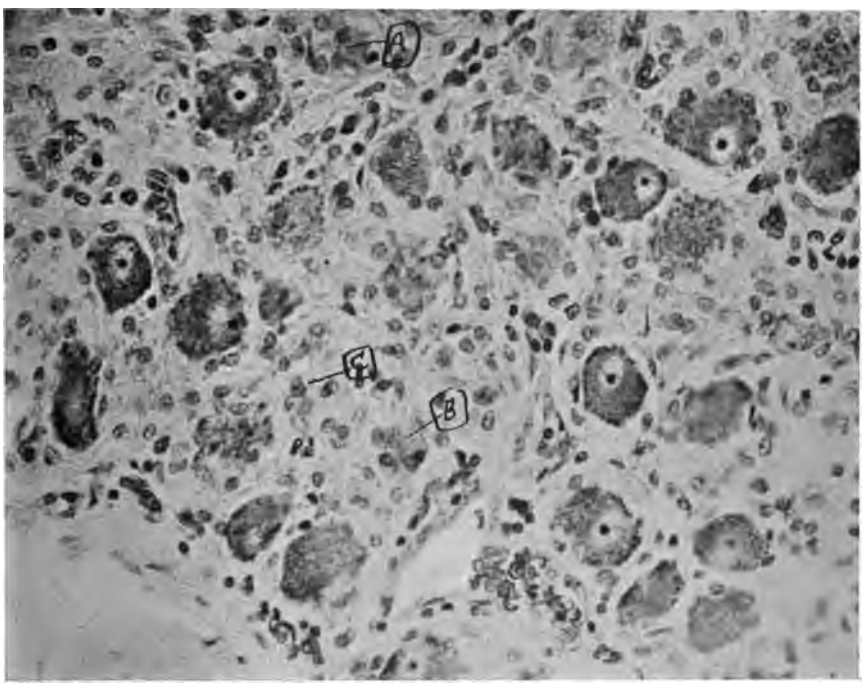

FIG. 2.—Cells *A*, *B* and *C* showing disintegration and replacement. Ep. dementia; 75 years. × 350.

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ANOMALY IN THE CIRCLE OF WILLIS, DUE TO ABSENCE OF THE RIGHT INTERNAL CAROTID ARTERY.*

By Lawson G. Lowrey,

HARVARD MEDICAL SCHOOL.

Anomalies in the formation of the circle of Willis are, in my experience, relatively common, but are usually found in the posterior communicating arteries or in the origin of the posterior cerebral arteries. The case here reported is the only one known to me in which the internal carotid artery was missing. The possibility of this anomaly is not mentioned in any of the standard textbooks of anatomy, and a hasty search through the available literature has revealed no other reported case.

The condition was found in a woman seventy-five years of age autopsied by me at this hospital. No other vascular anomalies were found. The right carotid trunk arose as usual from the innominate, and measured 4 millimeters in diameter. The left arose from the aortic arch, and measured 7 millimeters in diameter. Both vessels were traced to the level of the palate, and no anomaly of distribution was noted beyond the absence of any trace of the internal carotid branch of the right trunk. No bony canal was found in the petrous portion of the right temporal bone. The left vertebral artery was of unusual size.

The basilar artery divided into two branches of unequal size. The larger, right branch passed forward in the usual position of the posterior communicating artery and turned laterally into the Sylvian fossa, forming the middle cerebral artery. From the upper surface the posterior cerebral artery passed backward. Both anterior cerebral arteries arose from the left internal carotid, which was otherwise normal in its distribution. The right anterior cerebral, arising from the left internal carotid artery, was joined by a very fine twig from the right middle cerebral artery. The right ophthalmic artery arose from the anomalous middle cerebral.

* No. 59, Danvers State Hospital Papers. Reprinted from Anatomical Record, Vol. 10, No. 3, January, 1916.

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Absence of the internal carotid seems chiefly interesting because of the great rarity of the anomaly, and because of the functionally efficient rearrangement of vessels. It means, of course, either complete atrophy or agenesia of the third aortic arch and all of the distal portion of the primitive dorsal aorta on the right side.

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THE WASSERMANN TEST IN PRACTICAL PSYCHIATRY. AN ANALYSIS OF THE RESULTS OF THE TEST ON SIXTEEN HUNDRED ADMISSIONS TO DANVERS STATE HOSPITAL.*

By Lawson G. Lowrey, A.M., M.D.,

Fellow in Neuropathology, Harvard Medical School; Pathologist to Danvers State Hospital, Hathorne, Mass.

Introduction.

This paper is in no sense a critique of the Wassermann test as a biological reaction, but is the expression of the practical results of the use of the test in the routine examination of mental cases admitted to this hospital. So far as I am aware, the reports upon the use of this test among the insane which have so far appeared have dealt, to a large extent at least, with groups of selected cases. This is true of Plaut's[1] monograph, and of such other reports as have come to my attention. Southard[2] has written upon the statistics of 6,000 tests, but this has very little to do with the use of the results of the test in diagnosis within the institution.

The Wassermann test was first used in selected cases in this hospital in 1910, and in May, 1912, it became a part of the routine examination of all patients admitted. Of 1,714 admissions since that time, the test has been performed upon the blood serum of 1,600. In 276 cases the spinal fluid has also been tested. This series of tests — in which there are no selected cases — forms the basis of this paper.

Methods.

The method of performing the test has varied somewhat from time to time. All tests were performed in the testing laboratory of the department of diseases of the nervous system at the Harvard Medical School (now the Wassermann Laboratory of the State Board of Health), and the following summary of the method was supplied by the director: —

* No. 60, Danvers State Hospital Papers. Reprinted from American Journal of Insanity, Vol. LXXII, No. 4, April, 1916.

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Three antigens are used, — two from human heart reinforced with cholesterin, and an alcoholic extract of syphilitic fetal liver. Five cubic centimeters of a 5 per cent. suspension of washed sheep corpuscles to each tube. Anti-sheep ambocepter, tested daily, 2 units. Complement (10 per cent. guinea pig's serum) 2 units. Patient's serum, inactivated at 56°, .1 cubic centimeter with each antigen. Ambocepter and complement unit titrated daily. Controls of complement, ambocepter and salt solution for hemolytic power. Strong positive, slight positive and negative control sera: each antigen doubled in amount. Period for fixing complement, 1 hour. Doubtful cases repeated with double amount of serum and appropriate controls. Cerebrospinal fluid used in five times the amount of sera.

The attempt is made to secure a specimen of blood from each patient admitted. These are kept in the refrigerator over night, and sent to the testing laboratory early the following day. They have always kept in good condition.

Analysis of Results.

The results of the tests on the blood serum are summarized in the following table: —

Table I. — *Results of Blood Tests.*

	Male.		Female.		Total.	
	Number.	Per Cent.	Number.	Per Cent.	Number.	Per Cent.
Cases tested, . . .	864	-	736	-	1,600	-
Wassermann positive, .	164	18.98	92	12.50	256	16.00
Wassermann doubtful, .	37	4.28	25	3.39	62	3.87
Wassermann negative, .	663	76.74	619	84.11	1,282	80.13

The table is subject to further analysis. Thus, many more doubtful reactions have been obtained than appear in the doubtful group in the table. Where a decisive reaction was obtained in a later test, the case was transferred to that group. Hence, those here reported as doubtful are those in which repeated tests were doubtful, or those in which a second test was not done. Unfortunately, a number of the originally doubtful tests were not repeated.

Three cases with conflicting reports have been included in the positive group. Two of these had first positive and then nega-

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tive, and one positive, doubtful and negative tests. In this series there have been only a very small number of reversals of the reaction, but this is explained by the fact that only a few cases have had repeated tests. It is, of course, true that a single negative reaction does not exclude syphilis, nor, according to the later work on repeated tests, does a single positive reaction constitute indisputable evidence for infection. These criticisms, however, do not materially affect the conclusions to be drawn from the data presented.

In addition to the 256 cases with positive blood test, shown in the table, there are 17 cases (13 male and 4 female) with positive test in the spinal fluid, despite negative (12) or doubtful (5) blood test. (In only one of these cases, twice doubtful, was the blood test repeated.) This gives us 273 cases, or 17 per cent. of 1,600 admissions, with a positive test in one or other body fluid.

At this point we may consider the significance of a "doubtful" test. This term is applied to cases giving a positive test with the more delicate antigen, and a negative test with the less delicate antigen. According to some this also means syphilis. From a statistical point of view, this is not true. Of our group of cases, second and occasionally third tests have been performed in 43 cases where the first test was doubtful. Of these repeated tests, 9 (20.9 per cent.) were doubtful; 5 (11.6 per cent.) were positive; and 29 (67.5 per cent.) were negative. To the positive cases in the above group we may add the five cases with positive test in the spinal fluid and doubtful in the blood, but even then we find not more than one-quarter of the cases eventually showing positive tests after a primary doubtful test. It would certainly seem from this that a doubtful test by no means indicates syphilitic infection. *A doubtful test is, however, of sufficient importance to demand repetition or even examination of the spinal fluid* (which has not been done in all of our cases).

Clinical Diagnoses of Cases with Positive Tests.

Table II gives for the sexes individually and together the clinical distribution of the cases with positive blood tests.

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TABLE II. — *Clinical Diagnoses in Cases with Positive Bloods.*

PSYCHOSIS.	Male.	Female.	Total.
Organic.			
Paresis and cerebral lues,	113	32	145
Arteriosclerotic insanity,	7	2	9
Organic brain disease,	1	2	3
Senile dementia,	2	6	8
Functional and Toxic.			
Dementia præcox,	8	4	12
Manic-depressive insanity,	7	18	25
Epilepsy,	1	2	3
Imbecility,	3	9	12
Infection-exhaustion,	–	2	2
Psychoneurosis,	1	2	3
Alcoholic psychosis,	10	5	15
Morphinism,	1	3	4
Cardio-renal delirium,	1	–	1
Paranoid condition,	1	1	2
Presenile delusional insanity,	–	1	1
Not insane,	1	–	1
Unclassed,	7	3	10
Totals,	164	92	256

Of 164 positive blood tests among males, 113, or 68.8 per cent., occurred in cases with brain syphilis, *and the remaining 51 cases constitute only 6.8 per cent. of the male admissions other than paretics* (*751*). Of the organic diseases other than paresis, in which syphilis *might* be concerned in the etiology, there are 10 cases, while positive tests occurred in 33 of the functional and toxic cases and in 7 unclassed cases.

Of 92 positive blood tests among females, 32 or 34.8 per cent., occurred in paretics. *Excluding these, the remaining 60 positive cases constitute 8.5 per cent. of 704 admissions,* — a somewhat higher figure than for the non-paretic males, but not so great a difference as for the 1914 admissions alone (Lowrey[3]). Ten of the 60 fall into the "organic" group, 47 into the "functional and toxic" group, and 3 were unclassed.

Taking both sexes together, we find that 145 cases, or 56.7 per cent., of 256 cases with positive blood tests were paretic. *Ex-*

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cluding these there are 111 positive blood tests among 1,455 admissions, or 7.6 per cent. About two-elevenths of these belong in the "organic" group; eight-elevenths in the "functional" group; and one-eleventh in the unclassed group.

Findings in the Various Clinical Groups.

Of the various groups in which positive blood tests were found, the most interesting is obviously paresis. Tests on the blood serum were performed in 168 cases diagnosed paresis or cerebral syphilis (one case). There were 145 positive, 8 doubtful and 15 negative results; that is, 87.5 per cent. were positive and 10.3 per cent. were negative.

In no other group were the findings so high, and the results are presented in tabular form.

Table III.

Psychosis.	Cases Tested.	Positive.	
		Number.	Per Cent.
Senile dementia,	103	8	7.7
Imbecility,	113	12	10.6
Epileptic,	35	3	8.6
Dementia præcox,	240	12	5.0
Arteriosclerotic insanity,	96	7	7.2
Alcoholic psychoses,	213	15	7.0
Manic-depressive insanity,	340	25	7.3
Morphinism,	7	4	57.1
Paranoid conditions,	34	2	5.9
Toxic-infection-exhaustion,	29	2	6.9
Psychoneuroses,	37	2	5.4
Organic brain disease,	39	3	7.7
Presenile delusional insanity,	6	1	16.6
Not insane,	11	1	9.1
Unclassed,	102	10	9.8

It will be noticed that, for the most part, the percentages range between 5 and 10 for each group. The one notable exception is the small group of drug cases. Here more than half gave a positive test. None of these cases were retested at any time

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after the withdrawal of the drug, so it is impossible to say whether or not morphine has an effect on the reaction as seems to be the case with alcohol (*cf.* Craig[4]).

One interesting point comes out in a study of the cases of dementia præcox. Of the 12 cases with positive test, 6 were of the paranoid type, and they were characterized by the extravagance of their delusions.

It is hardly necessary to point out that larger series of cases in each psychosis are desirable. Accurate statistical conclusions cannot be drawn from so small a number of cases as we have in many of the groups reported in the present study. It is, nevertheless, evident that a person suffering from *any* psychosis may also be syphilitic, and that a positive blood Wassermann test *does not necessarily mean a psychosis of syphilitic origin. It is very important in all these cases to examine the spinal fluid.*

The percentage of positive tests here reported is somewhat less than that reported on Danvers cases by Paine[5] who, however, studied only 200 cases. Smaller series of cases (separate studies of 1914 and 1915 admissions for the annual report) have given me about the same percentage as reported in this paper, so it is felt that these figures are approximately correct for the insane in general.

In this hospital, both provisional and determined diagnoses are made by the assembled staff after all data have been procured; hence it is impossible to give the exact number of cases in which the finding of a positive Wassermann in the blood has pointed the way to a correct diagnosis, but it is certain that a not inconsiderable number of cases have been cleared up by using the test. It takes very much less time to clear up the diagnosis with the aid of the test than if we depend on clinical observation alone. A number of very early cases, which would not otherwise have been diagnosed, have been determined in this way.

In less than half of the cases with a positive test has a history of syphilis been obtained. Several cases with a history of syphilis and good treatment have given a negative test.

Results of the Tests in the Spinal Fluid.

The spinal fluid is submitted to the Wassermann and other tests in two main types of cases, — (*a*) those with positive or repeated doubtful tests in the blood, and (*b*) those with clinical signs pointing to paresis (or other organic condition) and negative blood test. Among the earlier cases of this series many

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cases with positive blood test were not punctured, but of this series 276 had spinal fluid tests performed. There are a few cases in which there was no suspicion of paresis, but puncture was done for some other reason.

The following table (IV) gives a summary of the results of the test for the sexes separately and together: —

TABLE IV. RESULTS OF SPINAL FLUID TESTS.

Male.

	Total.	FLUID WASSERMANN TEST.			
		Positive.	Doubtful.	Negative.	Unsatisfactory.
Blood Wassermann Reaction: —					
Positive,	131	83	5	41	2
Doubtful,	18	4	1	12	1
Negative,	38	9	–	29	–
Totals,	187	96	6	82	3

Female.

Blood Wassermann Reaction: —					
Positive,	59	26	1	32	–
Doubtful,	10	1	–	9	–
Negative,	20	3	–	17	–
Totals,	89	30	1	58	–

Both Sexes.

Blood Wassermann Reaction: —					
Positive,	190	109	6	73	2
Doubtful,	28	5	1	21	1
Negative,	58	12	–	46	–
Totals,	276	126	7	140	3

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TABLE V. — *Blood and Spinal Fluid Findings in Cases punctured.*

Psychosis.	Blood Wassermann Reaction.	Male Fluid Wassermann Reaction.				Female Fluid Wassermann Reaction.			Total Fluid Wassermann Reaction.				
		Positive.	Doubtful.	Negative.	Unsatisfactory.	Positive.	Doubtful.	Negative.	Positive.	Doubtful.	Negative.	Unsatisfactory.	
Paresis,	Positive	82	5	6	2	24	–	3	106	5	9	2	
Cerebral syphilis,	Positive	–	–	1	–	–	–	–	–	–	1	–	
Organic dementia,	Positive	–	–	–	–	–	–	1	–	–	1	–	
Arteriosclerotic,	Positive	–	–	6	–	–	–	–	–	–	6	–	
Senile dementia,	Positive	–	–	–	–	–	–	1	–	–	1	–	
Alcoholics,	Positive	–	–	7	–	–	–	5	–	–	12	–	
Manic-depressive,	Positive	–	–	6	–	–	–	10	–	–	16	–	
Dementia præcox,	Positive	–	–	3	–	–	–	1	–	–	4	–	
Imbecility,	Positive	–	–	2	–	1	–	7	1	–	9	–	
Inebriates,	Positive	–	–	–	–	1	1	–	1	1	–	–	
Epilepsy,	Positive	–	–	1	–	–	–	1	–	–	2	–	
Psychoneurosis,	Positive	1	–	–	–	–	–	1	1	–	1	–	
Paranoid condition,	Positive	–	–	1	–	–	–	2	–	–	3	–	
Infection-exhaustion,	Positive	–	–	–	–	–	–	–	–	–	–	–	
Morphine,	Positive	–	–	1	–	–	–	–	–	–	–	–	
Traumatic,	Positive	–	–	–	–	–	–	–	–	–	–	–	
Not insane,	Positive	–	–	–	–	–	–	–	–	–	–	–	
Acromegaly,	Positive	–	–	–	–	–	–	–	–	–	–	–	
Unclassed,	Positive	–	–	7	–	–	–	–	–	–	7	–	
Totals,	–	83	5	41	2	26	1	32	109	6	73	2	

Blood Wassermann Reaction.	Male Fluid Wassermann Reaction.				Female Fluid Wassermann Reaction.		Total Fluid Wassermann Reaction.				Blood Wassermann Reaction.	Male Fluid Wassermann Reaction.		Female Fluid Wassermann Reaction.		Total Fluid Wassermann Reaction.		Total Cases.		
	Positive.	Doubtful.	Negative.	Unsatisfactory.	Positive.	Negative.	Positive.	Doubtful.	Negative.	Unsatisfactory.		Positive.	Negative.	Positive.	Negative.	Positive.	Negative.	Male.	Female.	Total.
Doubtful	4	1	1	–	1	1	5	1	2	–	Negative	8	2	2	1	10	3	111	32	143
Doubtful	–	–	–	–	–	–	–	–	–	–	Negative	–	–	–	–	–	–	1	–	1
Doubtful	–	–	1	–	–	1	–	–	1	–	Negative	1	–	–	5	1	5	1	7	8
Doubtful	–	–	1	–	–	–	–	–	1	–	Negative	–	5	–	1	–	6	12	1	13
Doubtful	–	–	–	–	–	–	–	–	–	–	Negative	–	–	–	–	–	–	–	1	1
Doubtful	–	–	4	1	–	2	–	–	6	1	Negative	–	10	–	–	–	10	22	7	29
Doubtful	–	–	2	–	–	3	–	–	5	–	Negative	–	3	–	3	–	6	11	16	27
Doubtful	–	–	2	–	–	1	–	–	3	–	Negative	–	3	–	1	–	4	8	3	11
Doubtful	–	–	–	–	–	–	–	–	–	–	Negative	–	–	1	1	1	1	2	10	12
Doubtful	–	–	–	–	–	–	–	–	–	–	Negative	–	–	–	–	–	–	–	2	2
Doubtful	–	–	–	–	–	–	–	–	–	–	Negative	–	2	–	–	–	2	3	1	4
Doubtful	–	–	–	–	–	–	–	–	–	–	Negative	–	–	–	1	–	1	1	2	3
Doubtful	–	–	–	–	–	–	–	–	–	–	Negative	–	–	–	–	–	–	1	2	3
Doubtful	–	–	1	–	–	–	–	–	1	–	Negative	–	2	–	2	–	4	3	2	5
Doubtful	–	–	–	–	–	–	–	–	–	–	Negative	–	–	–	–	–	–	1	–	1
Doubtful	–	–	1	–	–	–	–	–	1	–	Negative	–	–	–	–	–	–	1	–	1
Doubtful	–	–	–	–	–	–	–	–	–	–	Negative	–	1	–	–	–	1	1	–	1
Doubtful	–	–	–	–	–	–	–	–	–	–	Negative	–	1	–	–	–	1	1	–	1
Doubtful	–	–	–	–	–	1	–	–	1	–	Negative	–	–	–	–	–	2	7	3	10
–	4	1	12	1	1	9	5	1	21	1	–	9	29	3	17	12	46	186	89	276

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Analysis of this table shows that there were 56 males and 30 females presenting clinical signs such that lumbar puncture was deemed necessary, despite the lack of a positive blood test. Of these, 17 gave a positive test in the fluid. There were 34 male and 32 female cases with positive blood test on whom puncture was not done. Of the cases with positive blood test, 82 of 130 males and 26 of 60 females, averaging over 50 per cent., gave also positive fluid tests. The number of unsatisfactory tests is high, but several of these cases died after a short stay in the hospital. Among the males there were more positive than negative fluid tests; among the females, nearly twice as many negative as positive results.

In Table V will be found the spinal fluid (and blood) results in the different psychoses. It will be noted that of the 109 cases with positive blood and spinal fluid, 106 were paretics, 1 was an imbecile, 1 a drug case and 1 a psychoneurotic. The latter 3 may, in the course of time, develop paresis. Of 126 cases with positive fluid test, 121 were paretics; and in addition to the above 3 cases there was 1 imbecile and 1 case of "organic" dementia.

Of the 143 tests on the spinal fluid of paretics, 123 were positive, 6 doubtful, 12 negative and 2 unsatisfactory. Hence there are, of 141 satisfactory tests, only 12, or 8.5 per cent., negative, while 87.2 per cent. are positive. Several of these negative cases were tested more than once. There were 25 cases of paresis with blood but no fluid test. The one case of cerebral syphilis had a positive blood and negative fluid test. Not quite 90 per cent. of these paretics had a positive blood test, and the same proportion had positive fluid test, *and the test is positive in both blood and fluid in about 75 per cent. of cases.*

The cases other than paresis with a positive fluid test, mentioned above, form a small residue of interesting cases.

In cases of paresis with a negative Wassermann, the other laboratory tests on the fluid are often positive. A forthcoming paper will deal with these results in detail.

Summary.

Statistics are presented dealing with the results of the Wassermann test on the blood serum of 1,600 cases admitted to Danvers State Hospital. Only cases are reported in which the test has been used as a part of the routine examination.

Of 864 male cases tested, 164, or 19 per cent., were positive.

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Of 736 female cases, 92 or 12.5 per cent., gave positive tests. Of the 1,600 cases tested, 256, or 16 per cent., were positive. Doubtful tests occurred in 3.87 per cent. of the cases.

Including cases with positive spinal fluid test and negative or doubtful blood test, 273, or 17 per cent. of 1,600 admissions, give a positive test at some point.

Of 164 positive blood tests among males, 113, or 68.8 per cent., occurred in cases of nervous syphilis. Of 92 females with positive blood test, 32, or 34.8 per cent., were paretics. Of 256 cases with positive blood test, 145, or 56.7 per cent., are cases of nervous syphilis. Excluding paretics from all figures, positive tests occurred in 7.6 per cent. of 1,455 admissions.

Of the non-paretic cases with positive blood, 20 are "organic," 80 are "functional" and 10 are "unclassed."

It appears that, if an insane man has a positive blood test, the chances are better than even that he will be a paretic; while if a positive test appears in an insane female, the chances are that she will not be a paretic. When paresis is excluded the chances are about 3 in 4 that the person with positive blood will have a "functional" psychosis.

An unexplained finding is the high percentage of positive blood tests among morphine habitués (small number of cases). No other non-paretic group contains any considerable group of cases with positive Wassermann. A person suffering from any psychosis may be syphilitic without belonging to the nerve syphilis group.

Doubtful Wassermann tests later show positive reactions in blood or spinal fluid in about one-quarter of the cases. The test should always be repeated.

Among the paretics of this series, the blood test was positive in 87.5 per cent. and negative in 10.3 per cent. The spinal fluid test was positive in 87.2 per cent. and negative in 8.5 per cent., while the test was positive in both fluids in 75 per cent. of the cases.

Of 276 cases with test on the spinal fluid there are 126 positive results. Of these, 109 had blood and fluid test both positive; 5 had doubtful blood and positive fluid test; 12 had negative blood and positive fluid test.

Of the 126 cases with positive fluid test 121 were paretics; 2 imbeciles; 1 was organic dementia; 1 a heroin case; 1 psychoneurotic. The latter 5 may in the course of time develop paresis.

The statistics here presented give evidence of the great practical importance of the Wassermann test in practical psychiatry.

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THE FUNCTIONS OF SOCIAL SERVICE IN STATE HOSPITALS.*

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The different conceptions which people may entertain as to the meaning of social service doubtless depend upon the form of the work with which they are most familiar. The oldest and best known work is that which is connected with settlements, children's agencies, relief societies, industrial welfare work, etc. The best general definition of social service is possibly that of Professor Peabody of Harvard University. He writes, "Social work is not merely a question of enthusiasm, sympathy, self-sacrifice or money, but it is a question of wisdom, discretion and the scientific interpretation and comparison of facts." This statement defines the work in a very broad sense, — possibly the whole is better understood when a single branch of the work is described in detail; however, it must be well borne in mind that the underlying principles are practically the same in all forms of the work, the aim and purpose being a common one, namely, that of the betterment of the human family.

One of the more recent developments of social work is that of medical social service, which Dr. Richard C. Cabot thus defines: —

Medical social service was organized in order to help the patient in his *real need*, of which sickness might be a mere incident. The real need may be his ignorance, recklessness, poverty, discouragement, feeble-mindedness or loneliness. The social worker understands the real need only when she learns four things: (1) the bodily state of the patient, his diagnosis and prognosis; (2) his mental condition; (3) bodily environment, which includes work, wages, housing and clothing; (4) his mental environment, which includes the influence, good or bad, of family, friends, enemies and neutral companions. All this involves a sympathetic study of the patient in his home; a personal, intimate knowledge is absolutely essential. This work must be based on real, friendly interest; no fake interest is effectual.

A highly specialized branch of medical social service is that which has recently been established in State hospitals for the

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mentally diseased. The principles underlying this work are identical with those of the general hospital service, although the methods of the work may differ somewhat, owing to the nature of the disease under consideration. Before plunging into the functions of social service in the State hospital, it might prove beneficial to consider the *hospital* first and to note some of its needs.

One frequently hears the word *asylum* used in connection with the State institutions for the mentally diseased. It is true that this word was formerly attached to institutions of this kind, and rightly so. We understand the word "asylum" to mean a place of refuge or sanctuary to which debtors and criminals formerly fled that they might secure immunity from arrest; the asylum was also an institution in which the aged, destitute or afflicted might find relief and care. Persons who entered the asylum were expected either to die soon or to remain there for life. Our conceptions of State institutions for the mentally ill have been somewhat colored by former methods and customs of the *asylum;* consequently we frequently hear the words "hospital" and "asylum" used interchangeably, many apparently believing them to exist for the same purpose, which is not the case. The word "hospital" conveys an entirely different meaning, mainly because it is different in every respect.

The most vital function of the hospital is curative and reconstructive; it aims to cure or help the patient, and rebuild his life as far as possible. The principle of segregation is not by any means the leading one. The asylum is a place of refuge; the hospital exists for the treatment of the patient and the rebuilding of his life.

Many patients leave the hospital doors to return to their previous occupations; many more to return to home life under more or less supervision. Granting it to be true that the hospital exists for reconstructive purposes, it becomes very obvious that the institution must gather facts with which to reconstruct the lives of its patients, especially so when it becomes necessary to create a wholesome environment to which the patient may return after a prolonged stay in the hospital. The modern medical man realizes the importance and value of the social aspects of disease and their bearing upon the treatment of the patient. As these social aspects are closely intertwined with physical and mental conditions the gathering of social data becomes an important part of the hospital equipment. Then, too, the hospital

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exists, or should exist, for the benefit of the community in which it is located, and should be in close contact with that community in order that people may easily secure advice as to home treatment or home conditions which have a medical bearing. All this means social work, and doubtless the introduction of social service into the State hospital was the development of the realization of these needs. By means of this department the hospital is better able to fulfill the purpose for which it is established.

With this brief insight into some of the needs of the hospital and its patients, we may now consider more in detail the functions of social service and what it is attempting to do.*

There are four main divisions into which the work falls. First, the home-visiting or after-care work, and closely identified with it the systematic visiting of patients who are boarded by the State in private families. This feature of the work is quite important and enjoyable. A personal, intimate knowledge of the patient is thereby made possible. It is a rare instance when co-operation is lacking, as the large majority of patients are highly appreciative of the interest shown by the hospital authorities.

James B., twenty-three years of age, single, residing in a large city, was a patient at the hospital for several months; mentally he was considered to be below the average. His occupation was that of usher in a theatre. His father was a chronic alcoholic and has served no less than twelve terms in the house of correction, where he is at the present time. James' mother was also somewhat weak mentally, and therefore unable to understand James and his ways. He had no ambition to work steadily or to learn a trade, preferring to read, or rather to devour, cheap novels, and to smoke cigarettes. He had other wasteful and undesirable habits which were a trial to his family. Soon after he left the hospital a home visit was made and the relatives advised as to methods of home care. Inducements were persistently offered to James to find some kind of steady work, which proved successful, for at present he is steadily employed earning about $8 a week, and considers himself very much of a man, for he now contributes a little to his family. Several home visits were necessary, but the family was co-operative, which accounts largely for the results.

Another instance of a somewhat different nature is that of Martha W., who was diagnosed as an alcoholic and mental defective. Martha W. is thirty-three years of age; of Irish nationality; married; has one son of eight years. Husband is a waiter and earns good wages. Martha has a sister who is a moral degenerate and is now serving time. Patient was more or less under the influence of this sister, who is considered

* The work described refers to that of the Danvers State Hospital.

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largely responsible for the drink and drug habits which our patient had contracted. Soon after leaving the hospital Martha's husband declared his inability to care for her properly, as she had resumed her former habits. The husband requested assistance; a long interview with him revealed the fact that he had tried harsh and stern measures with his wife, who naturally resented this treatment and turned against him. She possesses an inborn sense of artistic housekeeping, and is strongly attached to her son. Using these as incentives, attempts were made to help patient to overcome her habits through the development of her natural instincts; the husband's co-operation was earnestly sought and obtained. A recent home visit found patient much happier than at time of first visit, more contented with her home and less vindictive toward her husband. Her habits as to the use of alcohol and drugs are not yet overcome, although she uses both in great moderation as far as could be learned.

Numerous cases could be cited illustrating the value and nature of the home visit, in which patients are aided in meeting the difficulties or obstacles which may hinder health or happiness. Friendly advice and encouragement are effective agents in the home-visiting work. In a few cases co-operation is not established, either through fear and ignorance of hospital methods, or because of a low order of intelligence in the family.

Such was true in the case of Isaac G., a young Jewish man suffering from an incurable form of mental disease. After staying in the hospital for some time, Isaac's people desired his release, assuring the physicians that they could give him good home care. A home visit was made several weeks later, but the family were apparently away. Inquiry of a neighbor as to their whereabouts brought forth a story which indicated that Isaac was being abused and neglected by his relatives. These relatives were located by the visitor and interviewed. They volubly declared, with many characteristic gestures, that Isaac was living with a wealthy uncle in New York, who was employing him at a princely salary. Their statements during the interview were very contradictory. The mother feigned ignorance of the English language and refused to admit the visitor to the house. A police officer was secured and the house entered, amidst voluble protests. The home was in the Jewish tenement district of a large city; the rooms were small and dark, and very disorderly and dirty. In a small rear room, containing a chair, a table and a heap of soiled clothing, we found our Isaac concealed. The room was without heat, in the cold season of the year. From beneath the heap of soiled bedclothing peered the white, scared face of our Isaac, where his brother had hastily concealed him, for he was absolutely nude. Isaac was emaciated, pale and weak from lack of food and from frequent beatings, which, by the way, were administered to cure him of his delusions, referred to by the family as "foolish talk." He was removed from the house and taken to the

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station to await help from the hospital in returning him. This is an extreme case, although a true story.

Leaving the department of home visiting, which is most interesting from the educational point of view, we will consider the next division of work, — that of taking medical histories outside the hospital. These generally include the social situation, and when necessary, a description of the home conditions. The medical history is essential in order that a satisfactory diagnosis may be possible. When the hospital physician is unable to secure such information, then the social worker goes into the community and seeks it. It frequently happens that cases of distress are located in this work and alleviated. Robert K. was such a case. No history could be obtained by the physician, as no relatives of the patient had called at the hospital. A call at the home resulted in finding our patient's wife in a very poor physical condition, surrounded by a family of three young children, all in school. The eldest girl was apparently developing tuberculosis; the wife was unable to work, and the income had ceased when the patient came to the hospital. Relief was secured for the family, as to food, fuel and rent. Winter clothing was provided for the children. Medical aid was secured for the wife and daughter. In a comparatively short time the wife was able to find work and partly support her children. She is practically free from the worry and anxiety which was undermining her health. This is in reality a form of preventive work and quite important.

The third division of the work is that of investigation, to which there are four aspects: (*a*) investigation of home conditions previous to discharge of patient; (*b*) investigation of complaints relative to patients; (*c*) investigation of all applications for patients to board in private families; (*d*) a special form of investigation which relates to the social aspects of special diseases, as pellagra. Investigation is not as undesirable a thing as many suppose; it is in reality the securing of facts which will benefit the patient, the hospital and the community. One of the most important forms of investigation is that of the home conditions previous to the discharge of patients from the hospital. This does not necessarily mean a scrupulously clean house, a large income, good food and clothing, although these are important. It more specifically means that some responsible person must be in the home who appreciates the condition of the patient and understands, in a measure, how to give the

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proper home care. If the patient is unable to work there should be sufficient income to support him; if he can work, something definite should be done to make work possible. The neighborhood environment should be conducive to health, and the home environment should be such that the patient may be able to keep in as good a condition as when he left the hospital, other things being equal. When home conditions are unfavorable, the social worker should attempt to improve them so far as possible. In some cases this cannot be accomplished. One instance in which it was done successfully will illustrate the work.

John S., thirty-eight years of age; American born; shoe-worker; widower with eight children. This patient had used alcohol to excess for a short time, and this was an important factor in his case. Investigation revealed the fact that inadequate income and sickness had made it impossible for this patient to supply his family with sufficient food. He frequently went to work without food, substituting a breakfast with a glass of beer. Loneliness, discouragement, inadequate income and sickness were the real needs in this man's case. The house in which he and his family lived was in the midst of a saloon district; the rooms, six in number, were small, meagerly furnished and extremely untidy. Sanitary conditions were far below the standard; five children were sleeping in one small attic room; the eldest, a boy of nineteen years, was tubercular in appearance and complained of ill health. A daughter of sixteen years was acting as housekeeper, had received no training and had left school at fourteen years of age to help at home. This little flock of motherless children, whose father was a patient at the hospital, was supported by the small wages received by the two elder boys, averaging about $12 a week, $3.50 of which went to a relative for rent, an exorbitant rent for value received. The inadvisability of returning a patient to these conditions is very obvious. The family was advised to move, and guidance and financial assistance were secured to enable them to do so. A friend promised to see that patient secured work when able to leave the hospital. Urgent appeals are being made for a middle-aged woman to keep house and help in the training and care of the younger children. The family is now living in a new, comfortable tenement in a good neighborhood; they are united and happy. Frequent home visiting will be necessary for some time, for this is an example of reconstructive work previously mentioned.

Other forms of investigation refer to complaints relative to patients, either received directly from them or from some other source. Quite a different form of investigation is made relative to the boarding out of State patients. All applicants are interviewed. The fundamental parts of this form of investigation

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refer to the location of the home, the neighborhood and home environment, hygiene of the same. The art of housekeeping is quite important, but not as essential as the hygiene and habits of the family, the plan of home treatment, and the attitude of the proposed caretaker toward her prospective patients. The patients are studied, their peculiarities noted and, as far as possible, are placed accordingly. These patients are visited systematically and dealt with according to the situation found at the time of visit. They are returned to the hospital when it is advisable to do so.

Another branch of social work in the hospital is that of connecting needy persons with the proper agencies. Many who are committed to the hospital are mothers or breadwinners of families, which means that dependent persons are left without means of support.

Josephine W., thirty years of age; married; American born; good education; became a victim of alcoholic insanity. She was the mother of two boys, aged four and two and one-half years, respectively. When Mrs. W. came to the hospital these children were left in the care of their father, who was also an alcoholic habitué. This case was referred to the hospital by an outside physician, who considered the situation a serious one. Following an investigation the guardianship of the children was transferred to a paternal uncle, and they were placed in a good home. Shortly after this it became necessary to commit the father of these children to the hospital, where he remained for several months. Both improved and are out of the hospital on visit. They are both doing very nicely; the man is seeking employment and hopes soon to restore his home and to receive his children. They are eagerly looking forward to this time and sacrificing in order to have the home which they so carelessly destroyed through dissipation. They are trying very creditably to reconstruct their lives and are being encouraged in so doing.

There are many instances when the breadwinners of families become patients and their families are without means of support; these are connected with relief agencies and a permanent plan formed. Several patients need help in finding employment after leaving the hospital; these are sent to employment bureaus or to special firms, as the case may be. Other patients need to be connected with persons or agencies who will aid them in the moral sphere; others need proper recreation; still others need special physical attention, and are connected with general hospitals for treatment.

The recent establishment of the out-patient clinics is a new

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field for the State hospital. These clinics are held weekly in the larger cities of the district. Patients who are out on visit are invited to report and to seek such aid as they may require. Through the out-patient clinic the methods of the hospital may be more clearly understood. The advantages of consultation are open to those who are interested or in need of information.

The main divisions of the work are: (1) home visiting or after-care work of patients who are living in the community; (2) the securing of histories outside the hospital when the same cannot be secured in any other way; (3) investigation of various kinds which aid in the care and treatment of patients in the hospital, and in reconstructive work when they leave the institution; (4) the connection of needy persons with the proper agencies, such as hospitals, associated charity organizations, churches, children's agencies, etc. It will be observed that all parts of the work bear upon the social welfare of the patient, which benefits both hospital and community.

Results are sometimes difficult to determine in social work, inasmuch as one deals with silent forces. Reference has already been made to the real needs of patients, which are frequently those of ignorance, recklessness, loneliness, discouragement and poverty. Some results noted are those of the changed attitude of the community toward the hospital, a more intelligent comprehension of hospital methods and purposes, a broader knowledge of mental diseases and their treatment, and more reconstructive work in connection with the patients who leave the hospital. The friendly interest taken in the patient's welfare reveals the humanitarian spirit, and reacts favorably upon the patient and his family. The scientific methods of home care enable many to live in the community who would otherwise be obliged to remain in the hospital. The social data obtained for the hospital may prove to be a valuable contribution to hospital service. There is a financial aspect to social service in this line of work, in spite of the fact that the monetary value of a human being cannot be estimated. The expenditures of the hospital must, in the course of time, be lessened somewhat by the increased number of patients who may live in the community under supervision, to say nothing of the preventive work which may be accomplished through this department. Alcoholism and syphilis are contributing factors to certain mental diseases which are largely preventable, and the field for preventive work of this kind looms large before us. Closely connected with preventive

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work is that of finding employment for the mentally handicapped, — a large and very important part of the work.

The educational feature of social work in the State hospital is a most interesting one; such knowledge as the hospital may gather should be for the benefit of the public, and should be within its reach. The social service department acts as a sort of connecting link between the hospital and the community. Interest is aroused and attention is called to mental diseases and the methods of treatment. Social agencies, especially relief agencies, which frequently spend large sums of money in endeavoring to place a subnormal person on a normal basis, are now taking into consideration the mental condition of persons who seem to be failures. These failures, which frequently have been attributed to "pure cussedness," as a worker recently remarked, may now be better comprehended when an examination proves the person to be of low mentality and utterly unable to do the work of the average man or woman. The bringing together of the hospital and the community is educational to both and beneficial to all. The basis of medical social service is knowledge of the patient and his environment, secured only by a sympathetic study of the patient in his home. This implies that the spirit of social service is altruistic as well as scientific, for as Dr. Cabot states, "The work is based on real friendly interest," — friendship in its truest form, for it is service with the selfish element eliminated.

When one considers that the entire amount of work accomplished is but a mere "drop in the bucket," in comparison with the amount of work that is left undone, the only inspiration that can be derived from this kind of work is to forget the bucket and to remember the *value of the drop* which the bucket contains.

The functions of social service in State hospitals are threefold, — to ascertain the real needs of the patients from a social point of view, and to seek for remedies which will alleviate or cure; to obtain such knowledge of the patients as will aid the hospital to render efficient treatment and after-care of all persons who enter its doors; and to extend such knowledge into the community as will be of common benefit to society in the consideration of mentally affected persons and their problems.

The development of social service spells efficiency, and its success depends upon the co-operation of the community through the individual. When the individual realizes that the problem of the hospital is *his* problem, and that the privileges and duties

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of true citizenship include the earnest and conscientious consideration of the social causes of ill health, then, and not until then, can society hope to realize the full meaning of efficiency and development, whether it be in the economic field or in the intellectual world, or in the moral sphere. No man can live entirely to himself except it be an isolated case like that of Robinson Crusoe, and then not even he could live entirely to himself after his man Friday joined him.

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THE FREQUENCY OF EPILEPSY IN THE OFFSPRING OF EPILEPTICS.*

By D. A. Thom, M.D., Palmer, Mass.

The present paper is an attempt to determine the extent to which epilepsy is transmitted directly from parent to offspring. In order to secure available data for this work the records of 1,536 patients, whose epilepsy had brought them under the care of the Monson State Hospital, were examined. Of these, 236 had been married, but in only 175 were the records and available information sufficient to render them suitable for study, and it is this latter group which forms the basis of this paper.

One hundred and thirty-eight of these marriages resulted in one or more offspring, while the remaining 37 were sterile. Eighty-nine were females, 81 were males. The total number of children born of these 138 marriages was 553, an average of 4 to each mating. Only the epilepsy in these offspring was recorded, no consideration being made of other mental or nervous disorders at this time.

Before beginning my discussion I would call attention to some of the statements in the literature regarding heredity in epileptics. Spratling[1] found epilepsy as a hereditary factor in 16 per cent. of his cases; Doran,[2] in 19.3 per cent.; Binswanger,[3] in 11 per cent.; Dejerine,[4] in 21.2 per cent. Turner,[5] in a study of 676 cases, finds 37.2 per cent. with an epileptic heredity, but Turner's figures include both direct and collateral heredity, as a further analysis of his cases shows that only about 20 per cent. was transmitted from parent to offspring. Turner further states: "The most common cause of epilepsy is ancestral epilepsy." It is not surprising to find that Turner's private cases showed more epileptic heredity than his hospital cases, the former revealing epilepsy in 46.7 per cent. in the ancestors and collaterals, and the latter 35.9 per cent. This is accounted for by the more complete family histories in the private cases.

With just a word we may dismiss the group of 37 cases with-

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out children. They represent a little over one-fifth of the entire group, so that we can say, roughly, that 1 out of every 6 (236: 1536) of our new admissions was married, and 80 per cent. of these marriages resulted in one or more offspring. In 18 of these 37 cases the convulsions began previous to marriage; in 19 cases they began after marriage. Of this latter group 10 were males and 9 were females.

The remaining 138 cases, with histories of their ancestors and a careful study of the mental and social condition of their offspring, might well serve as the nucleus for a volume on epileptic heredity, but this would require the services of one or more social and eugenic workers for a long period of time. I appreciate that this paper will have no such value as one worked out with the aid of a social worker, yet I cannot but feel that it may stimulate some interest in the study of the patients confined in our institutions.

Aldren Turner,[6] quoting Gowers, states: "It is less easy to obtain a hereditary history as life advances and the preceding generation passes out of the reach of questions."

To what extent the innocent heir to an epileptic predisposition can control those environmental factors which would act as the exciting cause of a life-long malady, rendering the patient a burden to himself, his family and society at large, is only one of the many problems which the study of the offspring of the insane and epileptic presents.

In this paper I can state only my findings in this rather small series of cases, appreciating that it will have only a relative value. If it be that my views lean rather toward optimism than pessimism for the outlook of those predisposed by their ancestors to epilepsy, I am sure they will not more than neutralize some of the gloomy forecasts sent abroad by those who label every headache migraine, all muscular spasms epilepsy, and every man who takes a glass of beer an alcoholic.

The group of married cases which have been retained for study are further divided: —

Total number of married cases retained for study,		138
Epilepsy before marriage,		47
Males,	16	
Females,	31	
Epilepsy after marriage,		91
Males,	52	
Females,	39	

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The average duration of the epilepsy in the 47 cases having convulsions before marriage was 11.9 years in males and 8.1 years in females, while the average number of years elapsing between the marriage and the epilepsy in the 91 cases where the convulsions came on after marriage was 14.6 years in males and 12.4 years in females. Of the 39 females having their first convulsion after marriage, pregnancy was the exciting cause in 12 cases (30.8 per cent.). There is no one exciting factor among the males that gives such a corresponding high percentage as pregnancy in the females.

Another point worthy of note in this study is the fact that nearly twice as many females as males marry with the knowledge of their epilepsy. Doubtless it is easier for a woman to conceal the fact of her epilepsy under the guise of menstrual disorders, fainting spells, hysteria, etc., as her social condition confines her more closely to the house, where she is less likely to be observed during a convulsion. The large number of cases coming on after marriage in males includes, without doubt, many cases where arteriosclerosis and alcohol were the exciting factors. So it may be said that the only incident in married life that would be likely to act as an exciting cause of epilepsy would be pregnancy.

As previously stated, the total number of children born in consequence of these 138 marriages was 553, — 309 males and 244 females. It is with the epilepsy in these offspring and no other mental or nervous disorders that this paper is concerned. Collateral and dissimilar heredity will receive nothing more than mention at this time.

In the entire group (138 cases) direct-similar heredity in parents was found in only 8 cases, viz: —

	Cases.
Mother alone,	3
Father alone,	4
Mother, maternal grandmother and maternal great grandmother,	1

Therefore, it will be seen that only 5.8 per cent. of the ancestors of these patients had epilepsy. It may also be stated at this time that only one of these cases with epileptic heredity had epileptic offspring.

The personal histories of the offspring were obtained by various methods. In some instances the patients themselves, or their relatives and friends, were able to give information that was very satisfactory in personal interviews, while in the other and more

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numerous cases the desired information had to be obtained by means of correspondence. First, a printed blank was sent to every desirable case, asking for detailed information concerning the patient and patient's children. It was necessary in some cases to follow up the blank with a personal letter in order to clear up some obscure point. Then, with the information in their records, the data were compiled. Appreciating that the information obtained by such a method is subject to many sources of error, I have made no attempt to determine nervous or mental derangement other than the epilepsy in the offspring.

The epileptic convulsion, with its clinical features and the sequela, is a phenomenon that cannot easily pass unnoticed even by the most unobserving. Therefore the method adopted (not by reason of choice, but because there was no other available at this time) would be more applicable to the study of epileptics than of feeble-minded or insane, as the mental status of the informant would not be of such importance in determining the question of convulsions as it would in determining the mental status of another.

Of the 553 offspring resulting from the 138 marriages where one of the parents was an epileptic, it was possible to obtain a history of convulsions in only 10 of these children. In two instances there were two children having convulsions in the same family, so that in only 8 of the 138 meetings has the epilepsy made itself manifest to the present time. Six of these epileptic offspring died in early infancy of convulsions, leaving some doubt as to whether they would have become confirmed epileptics; of the remaining 4 the age at onset varied from the second month to the fifteenth year. The youngest offspring where information was received was four days old, the oldest fifty-five years. There are still about 225 children who are under twenty years of age; that is, they are still in the zone where 75 per cent. of the epilepsies begin, but only 6 of these are under one year of age and 16 between the first and fifth years, while the majority are between the fifteenth and twentieth years of life.

Gowers[7] states: —

> More than a quarter of all cases begin under the age of ten years; nearly half between ten and twenty; about one-seventh between twenty and thirty; one-sixth between thirty and forty; about 2½ per cent. between forty and fifty; 1 per cent. only between fifty and sixty; after which .5 per cent. only occur; 74 per cent. of the total number of cases begin under twenty.

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It would hardly be worth while at this time to make any conjectures as to what the probable outcome of these epileptic offspring will be. Much will depend upon the environmental conditions and external factors with which they come in contact. Rickets, gastro-intestinal diseases, infectious disorders, head injuries and alcoholism are only a few of the shoals upon which the predisposed might be wrecked.

In the cases past twenty years of age the chance of their becoming epileptics, although a factor to be considered, is comparatively less than in the younger group. It is my opinion that heredity will not play a very important part in the epilepsy of those 328 individuals now over twenty years of age.

Spratling[8] states: "The average age at onset in cases with epileptic family histories was ten to seventeen years;" and in a recent study, I[9] found that in 157 patients with heredity the average age at onset was eleven years. Although I know of no reason why hereditary defects might not lie dormant in an individual two or more decades before making themselves manifest, yet such a history is comparatively rare. (See table.)

From this table it will be noted that six of the offspring were congenital epileptics, all of them dying in early infancy from convulsions. Two of the cases are arrested: the offspring of A. D. had convulsions at four years of age and has had none since, is now twenty-one years of age; the offspring of E. T. had convulsions between the second and seventh years and has had none since, is now forty-three years of age. The offspring of E. B. and L. P., the two remaining cases, are confirmed epileptics, one being confined at Monson State Hospital, the other at Hospital Cottages for Children in Baldwinville. All the cases excepting one, E. A. T., developed their epilepsy after marriage, from one to thirty-one years elapsing between the marriage and the onset of convulsions. The exception (E. A. T.) began having convulsions at fourteen and was married at twenty-seven.

In three cases, P. P., C. D. and E. T., the offspring had convulsions before the parent. In only one case, L. P., was there any history of direct heredity, and in only two cases could an exciting cause be isolated, both being attributed to head injuries. The case, P. P., has since come to autopsy, but there was no evidence to indicate that trauma might have caused the epilepsy.

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Summary.

1. The records of 1,536 epileptic patients admitted to the Monson State Hospital showed that 1 out of every 6 was married.

Name of Patient.	Heredity.	Exciting Cause.	Relation of Epilepsy to Marriages.	History of the Epileptic Offspring.
P. P.,	None,	Trauma,	Epilepsy 9 years after marriage.	Two children died in infancy from convulsions, exact age not given. (Only two children.)
C. D.,	None,	Trauma,	Epilepsy 9 years after marriage.	Two congenital epileptics — both died from convulsions. (Five boys and five girls.)
A. D.,	One sister epileptic.	None,	Epilepsy 3 years after marriage.	Youngest had convulsions between the fourth and fifth years; none since; present age twenty-one. (Two boys and three girls.)
E. T.,	None,	None,	Epilepsy 31 years after marriage.	Oldest had convulsions between the second and seventh years; none since; present age forty-three. (Two boys and six girls.)
E. B.,	None,	None,	Epilepsy 1 year after marriage.	Oldest child has had convulsions since thirteen years; is now seventeen; confined to Baldwinville. (Three boys.)
E. S.,	None,	None,	Epilepsy 3 years after marriage.	Second child died in convulsions at the end of first week. (Three boys.)
L. P.,	Mother epileptic.	None,	Epilepsy 24 years after marriage.	Youngest had convulsions which began at fifteen years. (Two boys and four girls.)
E. A. T.,	None,	None,	Epilepsy 13 years *before* marriage.	Oldest died at fourth month during a convulsion. (One boy and one girl.)

2. Eighty per cent. of the marriages resulted in children.

3. One hundred and thirty-eight marriages resulted in 553 offspring, an average of 4 to each marriage.

4. Of the 553 offspring it was possible to obtain a history of epilepsy in only 10 cases (1.8 per cent.).

5. Of these 10 epileptics 6 died in infancy, 2 became confirmed epileptics, and 2 cases are arrested, one for seventeen years, the other for thirty-six years.

6. The study of the family history in 138 epileptics revealed epilepsy in one of the parents 8 times, and the study of the offspring of these same patients showed that it had been transmitted 10 times; but in two instances there were two children in the same family who had convulsions, so that the epilepsy was inherited and transmitted in 5.8 per cent. of the cases.

7. These figures correspond more closely with the recent work of Stuchlik,[10] who found inheritance of epilepsy in epileptics direct from parent in 4.1 per cent. of 176 cases, than they do with the findings of Turner, Doran and Binswanger.

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8. From the above it would appear that epilepsy is transmitted directly from parent to offspring less frequently than we have heretofore been led to believe.

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A BACTERIOLOGIC STUDY OF THE BLOOD OF SEVENTY EPILEPTICS, WITH SPECIAL REFERENCE TO THE BACILLUS EPILEPTICUS OF REED.*

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The obscurity surrounding the fundamental causes of so complex a group of neurologic disorders as the epilepsies will, in itself, bring forth from time to time many new observations, both etiologic and therapeutic in nature. Recently, Dr. C. A. L. Reed of Cincinnati has written concerning the isolation of an organism believed by him to be the cause of the convulsion in so-called "idiopathic epilepsy." The value of such an observation can hardly be overestimated, particularly since it contains vast possibilities in the opening up of a new field of therapeutic endeavor. Accordingly, we felt it to be essential that this work should be corroborated, merely from the point of view of recovering the organism from the blood of epileptic patients.

A brief summary of Dr. Reed's work will aid in the presentation of the results of our investigations. In February, 1915, Dr. Reed[1] stated that "the rôle of constipation as a causative factor in epilepsy is due to the more than probable fact that the initial cause is to be found in a specific infection." So convincing was this conclusion that he felt the necessity of stating that it was probably a bacillus of the gas-forming group, which, together with its toxins, had the faculty of accumulating in the tissues and in the blood.

Following this hypothesis, Dr. Reed[2] reported the finding of a specific organism as the cause of "idiopathic epilepsy," which he believed to be the epilepticoccus. This organism consisted "of granular bodies, sometimes arranged in diplococci, sometimes in chains, sometimes in clusters, while in certain cases all these forms were present in a single case." It was to be found in the blood either just before or just after a seizure, but in the in-

* From the laboratory and wards of the Monson State Hospital (for Epileptics), Palmer, Mass. Reprinted from The Journal of the American Medical Association, Oct. 7, 1916, Vol. LXVII, pp. 1088, 1089.

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terim it disappeared. Growth of the coccus occurred readily on ordinary mediums, and animal experimentation fulfilled the third of Koch's laws. In conclusion, the presence of the epilepticoccus was stated definitely to be pathogenic for the disease.

In a later communication, Dr. Reed[1] stated that "epilepsy is an infection depending on a definite spore-bearing organism, — the *Bacillus epilepticus*." The discarding of the epilepticoccus was explained briefly (in a footnote) on the basis of the changing morphology of the bacillus, as shown at different stages of its development. This had given rise to some confusion, and the discredited researches of Bra are quoted in defence of this change in the causative agent. In this paper it was stated that cultures from the blood of epileptics showed the organism present in a large number of cases, more abundant immediately preceding or during a convulsion, although frequently found at other times, and, less readily, in "long interval" cases. The duration of the disease had no influence, apparently, on the finding of the bacillus, for mention is made of a case of more than twelve years' duration in which cultures were found positive. The organism was said to grow slowly in bouillon or on agar-agar (taking from two to five days), and to stain best with carbolfuchsin, although other stains could be employed. Finally, injection of pure cultures of the organism into rabbits was stated to produce a syndrome analogous to epilepsy in man.

Brief mention of the work of Bra may not be inadvisable at this point. In 1902 she[3] described the neurococcus as the essential cause of epilepsy. Besta, working in the laboratory of Ceni, failed to find the organism in a total of 375 cultures, of which 370 were sterile, the remaining 5 being contaminated. Ghiliarowsky of Moscow found the organism in insane patients (not epileptic), and concluded that it was a contamination. The following year Tirelli and Brossa examined a total of 58 cultures with negative results. Lannois and Lesieurs of Lyons also were unable to find the neurococcus.

With these facts in mind we began an investigation along the lines taken by Reed and his assistants. In all, 70 cases of clinically idiopathic epilepsy, without any demonstrable organic lesion, have been studied. In this group were included 47 women and 23 men. In 55 of these patients no exciting cause could be found. In 14 cases the exciting cause was given as: pregnancy, 2; pneumonia, 1; scarlet fever, 1; dentition, 3; indigestion, 3; pertussis, 2; rachitis, 1, and measles, 1. In

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this group one case (blood taken during status) was included in which the assigned cause was given as "head injury," but necropsy failed to reveal any lesion of the calvarium or brain structures. The age of onset of the disease varied from infancy to forty-one years (Table 1). The age at time of first-known convulsion is here taken as the age of onset.

TABLE 1. — *Age of Onset.*

AGE.	Number of Cases.
Before end of first year,	8
Between age of 1 and 5,	14
Between age of 6 and 10,	24
Between age of 11 and 15,	13
Between age of 16 and 20,	4
Between age of 21 and 30,	6
Between age of 41 and 45,	1
Total,	70

The duration of the epilepsy was from three to forty-five years; periods of remission, no matter what their length, are included in the duration (Table 2).

TABLE 2. — *Duration of Epilepsy.*

DURATION (YEARS).	Number of Cases.
1 to 5,	8
6 to 10,	15
11 to 15,	13
16 to 20,	6
21 to 30,	22
31 to 40,	5
41 to 45,	1
Total,	70

In regard to the incidence of constipation, on which Reed laid considerable stress, it was found that all of the 70 patients were suffering in varying degrees from this complication.

Our routine method of examination consisted in the with-

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drawal of from 5 to 10 cubic centimeters of blood from the median basilic vein. The blood flowed directly from the needle through a glass tube (connected to the needle by a short piece of rubber tubing) and into a test tube (200 by 20 millimeters) holding 2 cubic centimeters of a solution containing 6 per cent. sodium chloride and 1.5 per cent. sodium oxalate. The oxalated blood was planted immediately on agar-agar slants and in bouillon. Each culture tube was inoculated with 1 cubic centimeter of blood. The incubated cultures were not examined until the fifth day, unless a growth was noted on the agar slants, or turbidity of the bouillon occurred before that time. All apparatus used was subjected for twenty minutes to a temperature of 250° F. under 15 pounds' pressure.

In all, 80 specimens of blood were obtained; 10 of our cases were repeated. The total number of cultures was 160. Table 3 shows the relation of the specimens taken to the time of convulsions.

TABLE 3. — *Relation of Specimens to Time of Convulsions.*

WHEN TAKEN —	Number.
During status,	4
At cessation of grand mal seizure,	10
At cessation of petit mal seizure,	2
Within one hour after last seizure,	29
Between 1 and 2 hours,	10
Between 2 and 3 hours,	6
Between 3 and 4 hours,	2
Between 4 and 5 hours,	3
Between 5 and 6 hours,	2
Between 6 and 7 hours,	1
Between 7 and 8 hours,	3
Between 8 and 9 hours,	1
Between 9 and 12 hours,	3
Between 12 and 24 hours,	1
None for several days,	3
Total,	80

The specimens obtained at cessation of grand mal seizures were taken as soon as the convulsive movements of the arms had quieted sufficiently to allow venipuncture to be performed.

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In the other cases from 1 to 8 grand mal seizures preceded the taking of the specimen. Two of the three patients free from seizures for several days were examined again at intervals of fifteen minutes and two hours, respectively, following a single grand mal seizure.

Examination of these cultures showed that 156 were sterile. Smears were made from every culture incubated, the lack of growth on the agar slant or clearness of the bouillon not preventing such procedure. Of the four cultures that showed growths, one (taken five hours after a grand mal seizure) showed staphylococci in bouillon. Another specimen of this patient's blood, obtained ten minutes after the last of a series of five seizures, gave sterile cultures on agar and in bouillon. The other three cultures all showed a similar organism. On a Petri dish (blood taken five hours after seizure) two colonies were found outside the areas over which the blood had spread. In the second case (taken twelve hours after a seizure) a similar colony was found on an agar-agar slant. In the third (taken during a grand mal seizure), a scanty growth was found in bouillon. All of these growths were found before the third day of incubation. With methylene blue as a stain, the organism was found to be a very large oval-shaped bacillus, with deeply staining ectosarc and pale staining protoplasm. It grew rapidly on agar-agar slants, and was distinctly fungoid in appearance. Injections of pure cultures, both intravenously and intraperitoneally, into a rabbit failed to produce any systemic disturbance, and ten days after the last injection the animal was returned to its mates. Feeling that this was a contamination, Petri plates were placed about the laboratory, and a similar organism was isolated. Fortunately, at about this time Dr. Reed sent us a subculture of *Bacillus epilepticus*. Examination of specimens from it showed an entirely different organism from the contamination described above. All three of these cases were repeated either during or within fifteen minutes after the cessation of a grand mal seizure, and the cultures were found to be sterile.

In addition to the foregoing group of cases two patients with hemiplegia were examined, one the day following the seizure and the other at the cessation of a convulsion. These cultures were sterile. Similar results were found in two cases with myoclonus. Both specimens were taken within a half hour after a grand mal seizure.

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In a personal communication, Dr. M. M. Canavan,[4] assistant pathologist to the Massachusetts Commission on Mental Diseases, has given us the results of post-mortem cultures from 17 epileptics on whom necropsies were held during the past year. In every instance, from 2 to 7 loci were studied for bacteriologic infection, and these have included always the heart's blood. In 3 of these cases all cultures were found to be sterile, a total of 13 loci being studied. In the remaining 14 necropsies, with a total of 70 loci investigated, Dr. Canavan was unable to find any organism approaching the morphology of *Bacillus epilepticus* as described by Dr. Reed.

Summary.

1. In a series of 70 cases, with a total of 160 blood cultures, there were 156 sterile cultures. The remaining 4 showed contaminations.

2. Four cases with either myoclonus or hemiplegia also gave sterile blood cultures.

3. In a series of 17 necropsies on epileptics, Dr. Canavan, in a bacteriologic study, was unable to find any organism resembling *Bacillus epilepticus*.

4. In conclusion, it would seem evident that, in the 70 epileptic patients studied, the epileptic syndrome was not due to the *Bacillus epilepticus* of Reed.

References.

1. Reed, C. A. L.: The Bacillus Epilepticus: Third Report. The Journal A. M. A., May 20, 1916, p. 1607.
2. Reed, C. A. L.: Diagnostic Methods and Pathologic Constants in Idiopathic Epilepsy. The Journal A. M. A., Jan. 29, 1916, p. 336.
3. Bra: Recherches microbiologiques sur l'épilepsie.
4. Personal communication from Dr. Canavan to Dr. Thom, dated June 29, 1916.

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ABNORMAL RELATION BETWEEN LIVER AND BRAIN WEIGHTS IN FORTY-TWO CASES OF EPILEPSY.*

By D. A. Thom, M.D.,

PATHOLOGIST TO THE MONSON STATE HOSPITAL, PALMER, MASS.

This paper or rather note is along the same line of research that Dr. Myerson of the Taunton State Hospital reported in the "Journal of Nervous and Mental Disease," July, 1914, and it was due to the fact that Myerson reviewed a small group of epileptic cases at the Monson State Hospital that my interest in the abnormal relation between the liver and brain weights was aroused. Myerson divided his cases into four groups: —

1. The emaciated and non-emaciated senile dementias.
2. The dementia præcox group on which Southard based his paper, "Focal Lesions in Dementia Præcox."
3. Emaciated general paretics.
4. Small group of epileptics, non-emaciated, dying and autopsied at the Monson State Hospital.

It is regarding this latter group of cases that I wish to contribute my findings.

As these data were collected and an arbitrary standard accepted for normal liver and brain weights before Dr. Myerson's paper came to my notice, I find that I have given a little more freedom to the limits to which the weights of these organs must confine themselves and still be called normal. I also accepted the liver-brain weight ratio as 7 to 6 instead of 16 to 13, but these changes in no way affect the ultimate results. These data were collected from 42 cases of clinically certain epilepsy which came to autopsy at the Monson State Hospital during the past two and one-half years. Those cases were considered which died in a well-nourished condition, where the terminal disease was of short duration, and the patient of such an age that development was complete, yet discarding those cases of advanced years where senile changes might be suspected on account of the advanced years.

Most of the cases in this series at the time of death were between seventeen and forty-five years of age. Pulmonary edema, broncho-pneumonia, lobar pneumonia, status epilepticus

* Reprinted from The Journal of Nervous and Mental Disease, Vol. 43, No. 5, May, 1916.

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and asphyxia were the causes of death in over 90 per cent. of the cases, so that the gross lesions found at autopsy could not well be attributed to the terminal disease. It is in such a series as this that one might expect to find the normal 7 to 6 liver-brain ratio to hold good; but it was the rather large number of cases, 26 (62 per cent.), in this series where the brain outweighed the liver that I offer as an excuse for the publication of this note. I have put my comparative data in tabulated form and summarized them briefly to show that not only was there an abnormal relation existing between the liver and brain weights, but in only a very limited number of cases did the weights of these organs fall within the limits of what I arbitrarily accepted as normal liver and brain weights. I have made no distinction between the normal weight of male and female organs, but have widened the normal limits to include both, viz., normal liver, 1,500 to 1,800 grams; normal brain, 1,250 to 1,400 grams.

SUMMARY.

Brain heavier than liver, ...	26 cases (62 per cent.)
Liver heavier than brain, ...	16 cases (38 per cent.)

ABNORMAL RELATION BETWEEN LIVER AND BRAIN WEIGHTS, 26 CASES.

Brains.

	Cases.
Brains weighing between 1,250 and 1,400 grams (normally), . .	8
Brains weighing over 1,400 grams, ...	8
Brains weighing less than 1,250 grams, ...	10

Livers.

Livers weighing between 1,500 and 1,800 grams (normal), . . .	2
Livers weighing over 1,800 grams, ...	0
Livers weighing less than 1,500 grams, ...	24

SIXTEEN CASES OF LIVER AND BRAIN WEIGHTS NORMAL.

Brains.

Brains weighing between 1,250 and 1,400 grams (normal), . . .	6
Brains weighing over 1,400 grams, ...	4
Brains weighing less than 1,250 grams, ...	6

Livers.

Livers weighing between 1,500 and 1,800 grams (normal), . . .	6
Livers weighing over 1,800 grams, ...	2
Livers weighing less than 1,500 grams, ...	8

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SUMMARY OF WEIGHTS IN 42 CASES.

	Normal.	Overweight.	Underweight.
Livers, ...	8	2	32
Brains, ...	14	12	16

Of the 16 cases where the relative liver and brain weight was normal, in only 2 were the weights of the liver and brain both within the normal limits in the same case, *i.e.*, 40 of the 42 cases studied revealed either an abnormal relation between the liver and brain weights, or that one of the organs was of abnormal weight. In some cases both conditions were true. The most common gross abnormalities named in order of their frequency were as follows: atrophy of liver, atrophy of brain, overweight of brain (probably due to edema or hydrocephalus), hypertrophy of liver. The liver is most commonly diminished in size by some structural alteration such as cirrhosis, acute parenchymatous degeneration, and the hypertrophies are apt to be due to tumors, abscesses, fatty and amyloid degeneration, acute congestion and in some cases cirrhosis.

The question now arises to what extent, if any, can the convulsions be attributed to those pathological changes found in the liver; or, more broadly and more practically, to what extent can the abnormal functioning of a normal brain be due to structural changes in organs remote from the nervous system? And are we justified in feeling that the abnormal functioning of a normal brain may be secondary, and the structural alteration in other organs the primary process? Is it true that in our efforts along special lines of research, especially in the study of the nervous system, we are holding the brain at such close range that we are losing sight of the system as a whole, of which the brain is only one of the many component parts? With such striking examples before us as uremic and infantile convulsions and those following the administration of exogenous poisons such as strychnine, with autopsy material presenting striking pathological changes in the liver, kidneys, spleen, ductless glands, etc., associated with brains that defy macroscopic examination as to their abnormalities, it would not be surprising to find that much of interest developed from a careful study of the visceral organs, both in the psychoses and epilepsies.

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A QUESTION OF EPILEPTIC DEMENTIA WITH RECOVERY.*

By D. A. Thom, M.D., Palmer, Mass.

Summary of Case. — Male, aged thirty-seven years. Admitted to Taunton State Hospital April 20, 1906. Transferred to Monson State Hospital May 3, 1906.

Family History. — Negative.

Previous History. — Patient was born in Portsmouth, R. I., thirty-seven years ago. He has always been sensitive, easily offended, quick tempered and seclusively inclined. Attended school until sixteen years of age; advanced as far in studies as second year in high school; was quick to learn and retained his knowledge well. Was employed as private secretary by the Old Colony Brewing Company; received good wages and was well liked by employer. He never used liquor in any form; smoked moderately.

Medical History. — During teething period patient had one convulsion. Had whooping cough at six years of age, scarlet fever and measles at seven, and diphtheria four years later; no convulsions associated with any of these illnesses.

When about twenty years of age he had what appeared to be at that time a petit mal attack; he lost consciousness and fell, hitting his head against a door, sustaining a slight injury. During the next two years the attacks became more frequent, but were usually of the petit mal type. At the beginning of the third year the character of the convulsions changed; instead of the daily petit mal seizures he would have two or three grand mal convulsions, when he would become markedly cyanosed, froth at the mouth and go through the typical convulsive movements of the epileptic. The frequency and severity of the attacks were such that the patient was mentally confused most of the time; speech became slow and retarded, orientation imperfect. He had shown no violence up to the time of his admission, but had fixed ideas concerning members of his family — thought they were working against him. Such was the history when he was committed to Taunton. From the following history it will be noted that he was somewhat improved mentally when received at Monson.

Hospital History. — Admitted to Monson State Hospital May 3, 1906.

Physical Examination. — Negative, with exception of smallness of ears, constipation and a typical bromide rash, which covered the face, chest, back and inner aspect of both upper and lower extremities.

Neurological examination revealed nothing abnormal.

* Reprinted from The Journal of Nervous and Mental Disease, Vol. 44, No. 6, December, 1916.

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Admission Note. — Patient was depressed most of the time at first; consciousness was clouded for a day or two previous to a convulsion, and after seizures patient was irritable, lacking in apprehension. He slept poorly and was apt to wander about at night. Memory was very good.

For seven years subsequent to his admission the patient showed a slowly progressing mental deterioration. For the first two years he was employed in the industrial room at work which required a certain amount of planning ability and intelligence. Although he performed his work well, he was cross, irritable and opposed to all hospital discipline. At times he was impulsive and violent, making attacks on other patients. He was faultfinding to the extreme. On several occasions it was necessary that he should be placed in seclusion on account of his post-epileptic mania. After four years' residence in the hospital the patient presented the following symptoms of marked dementia: He was doing no work whatsoever, as he was incapacitated for either mental or physical effort, no matter how slight it might be. He was completely disoriented, apprehension and apperception were entirely lacking, clouding of consciousness seemed quite complete, and memory for both recent and remote events was gone. He was untidy in both dress and personal habits, soiled himself and bed frequently, and had to be dressed by attendant; was able to feed himself and would usually discriminate between what was eatable and what was not, but would use his fingers instead of knife and fork. Only occasionally from out of this mental wreckage would emanate periods of violence, which were short and impulsive outbursts. This condition, which simulated so closely a true epileptic dementia of the severest type, lasted for a period of nearly three years. As will be noted by the chart upon which the number of convulsions has been graphically plotted, the patient was having 20 to 30 severe convulsions each month, but until March, 1913, had never had status. On March 12, 1913, patient began to have a series of convulsions which were of unusual severity, and did not respond to the usual treatment. This series of convulsions numbered 69 in all, and lasted twenty-five hours. The patient was in complete coma and death seemed to be imminent. His family was notified of his condition, and the last rites of the Church administered. On the evening of March 13 his convulsions ceased, and within a few hours his general condition improved. Ten days later his condition was no longer considered dangerous, and in three weeks he was up and about the ward; he had not had a convulsion since the attack of status, had gained 18 pounds, and showed marked improvement mentally. He began to apprehend things which were going on about him, and his intake was keener; he became tidy in personal habits, and it was no longer necessary to aid him in dressing. On April 15, 1913, or exactly thirty-two days after the attack of status, he had one convulsion, after which he was very much excited, quarrelsome and violent, and it was necessary to place him in seclusion. This condition lasted but a few hours, and on the following day he had entirely cleared up. In May he had a similar attack, and in

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June he had his last epileptic seizure. Although it is now nearly three years since the patient had his last convulsion, and he has shown marked physical and mental improvement, the epileptic personality still persists. He is irritable, impulsive and quarrelsome, and is faultfinding to the extreme. His complaints are uncalled for and unreasonable. Toward the other patients he bears a feeling of superiority, which often results in fistic encounters. Usually he is kindly disposed toward attendants and physicians, but it takes only slight provocation for him to be abusive when physicians do not comply with his requests. He has accused attendants of assault which, upon careful investigation, proved to be without foundation. Stones, scissors, and a fork have been found secreted upon his

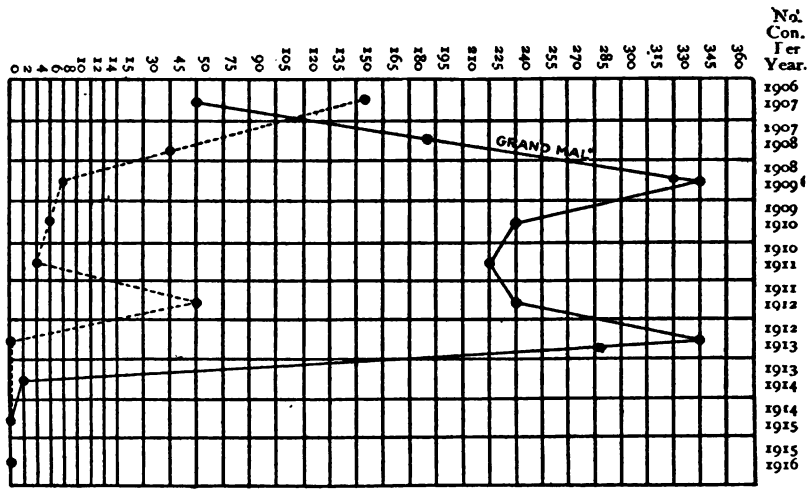

CHART 1. — Showing the number of convulsions per year from admission to Monson State Hospital, May, 1906, until cessation of convulsions, June, 1913.

person; these, he stated, he would use at the proper time. When permitted to go to the public entertainments he would create a disturbance by his noisy, boisterous actions, and would decorate himself in a fantastic manner.

He is hyper-religious, spends much time in daily prayer, and could recite numerous prayers of unusual length without a mistake. For some time it was his custom to go to a neighboring field, where he would hold devotional exercises by himself, but with so much fervor that it disturbed those living near by, so it was found necessary to keep him on the ward to prevent further annoyance to neighbors. He immediately went to bed, where he remained for three weeks; would not talk or eat in the presence of any one, and later refused to take food at all. He would lie in bed with eyes closed and resist all attempts made to open them. When informed that tube feeding would be resorted to he relented. In October,

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1915, his parole was restored, and he began working out of doors, raking leaves and fixing the gardens for winter. He performed his duties faithfully and intelligently. When it became too cold to stay outside he was given work on the ward, which he did in a most satisfactory manner. As he is an excellent penman, the attendant has him copy the names of the patients for the daily report, and he has memorized, alphabetically, the names of the 68 patients on his ward and the adjoining one. For the past six months he has been getting along better with the other patients and the attendants. He is allowed to go to the dances and picture shows, and behaves like a gentleman. His only fistic encounter happened very recently, and, strange to relate, he did not take the initiative. It is rather too much to hope that he will ever lose his epileptic characteristics for any length of time; they preceded his convulsions by nearly twenty years (with the exception of one in infancy), and will probably remain until the end.

The following is a summary of mental examination which was done Feb. 20, 1916: —

Orientation. — Patient is perfectly oriented as to time, place and person; gives day, date, month and year correctly. Names hospital, nature of disease treated here, knows names of all attendants and building in which he resides; knows names of all physicians on staff at present, also those who have left within the past two and one-half years. Knows name of town in which hospital is located, and its geographical relation to other towns is appreciated.

Memory. — Exceptionally keen for all events occurring prior to the onset of convulsions at the age of twenty-three years. He is well informed regarding his family history; is well acquainted with the facts concerning the lives of his father and mother. He has five brothers and four sisters, and is able to give their names and ages correctly. His earliest recollection of personal life began at five years, when he first went to school. His ability to remember the details of his remote past borders on hyperamnesia. For names, dates, location and events in adult life he shows marked degree of retentiveness. Beginning at the onset of his convulsions, and terminating soon after their cessation, there is a period during which processes of perception were entirely blocked; that is, the sensory stimuli with which he came in contact were inadequate to cross the threshold of consciousness, his intake being completely cut off. This period assimilated a true retrograde amnesia, although being produced under different pathological conditions. Since the remission of the convulsions his memory is unimpaired. His school knowledge is well retained; he answers all questions in history, geography and arithmetic with more than an ordinary degree of intelligence.

Emotional Tone. — On day of examination emotional tone presented nothing unusual, although by his record it is obvious that he has states of marked depression, also periods of religious fervor which border on exaltation.

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Train of Thought. — Inclined to be self-centered, but when drawn away from the ego he was quite capable of discussing intelligently general subjects, and was well informed regarding current events of the day.

Attitude and Manner. — Toward the examiner he was polite, interested in examination, and co-operated in every possible way. Toward other patients he still retains his feeling of superiority.

Conduct. — He is inclined to be irritable, quarrelsome and faultfinding, but to a lesser degree during the last six months than before. He has daily duties which he performs conscientiously and with a great deal of pride.

Attention. — Attention, concentration and capacity for retention are quite normal.

This case appealed to me as one of unusual interest, inasmuch as the recovery from the mental impairment, which was identical with our grave types of epileptic dementia, was quite complete. There remains no doubt as to the clinical certainty of the epilepsy. The infantile convulsion, the epileptic personality which existed for years previous to the second seizure, assures us of our diagnosis, even in the absence of a hospital history covering a period of ten years.

Although the mental condition in the case just cited was in no way different from a true epileptic dementia, we cannot so regard its pathology without establishing the exact sense in which the term dementia is being used.

Bolton defines dementia: "The mental condition of patients who suffer from a permanent psychic disability due to neuronic degeneration, following insufficient durability," while Turner states that "Dementia is brought about by those factors which cause alterations of permanent character in the structure of the cerebral cortex." Notwithstanding the fact that Turner lays stress upon the permanent character of the cortical changes which underlie dementia, he later describes, under the heading of "Post-paroxysmal Psychosis," a condition of acute dementia following a severe seizure, a series of seizures or status epilepticus, and goes on to say that " The patient assumes the mental attitude which was present before the series of convulsions." He does however, correlate the two statements to a certain degree when he states that " repeated attacks of this kind exert, in the course of time, a markedly deteriorating influence upon the general mental state."

Tuke writes as follows regarding dementia: "We see, then, in dementia a diminished state of mental power shown either in

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impaired thought or action, combined or separately, and one or the other of these states may be either transitory or persistent."

Summary. — There seems to be little gained from conjecture. We may assume that there was certainly a lack of neuronic stability, or the patient would not have had the infantile convulsion, yet we are immediately confronted with the fact that the patient had convulsions almost daily for a period of thirteen years, and is still without evidence of gross cortical degeneration.

By accepting Tuke's definition of dementia we can diagnose the case under consideration as epileptic dementia with fair recovery, an unusual condition, to be sure.

If Bolton's conception of dementia be the correct one we would not expect a recovery. The fact that there was a recovery would necessarily throw it out of the dementia group. It seems that it is time to settle the question of the permanency of dementia, and, if we are to consider it due to irreparable cortical changes, to refrain from using it in the acute mental confusional states which go on to recovery; that is, separate in a clinical way the functional from the organic. This present case is an excellent example where such a distinction would be of value.

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A POINT SCALE FOR THE MEASUREMENT OF INTELLIGENCE IN ADOLESCENT AND ADULT INDIVIDUALS.*

By Robert M. Yerkes, Ph.D., Boston,

psychologist, psychopathic hospital, boston, and assistant professor of comparative psychology, harvard university,

and

Cecilio S. Rossy, M.A., New York,

formerly interne in psychology, psychopathic hospital, now psychologist, psychiatric clinic, sing sing prison, new york.

The application of the original pre-adolescent point scale has proved that it yields most reliable measurements of intelligence from the ages of six or seven to twelve or thirteen years. The scale offers too few opportunities for credit to individuals under seven years, and too few opportunities for failure to bright individuals above thirteen years. It has, therefore, seemed to us desirable to develop two additional point scales to supplement the original scale, the one to be called an infant scale, the other, an adolescent scale. With the completion of these we should have, for the measurement of intelligence, three scales of twenty tests each, which may conveniently be designated as (1) the infant scale, (2) the child scale, and (3) the adolescent scale. The latter should be understood as covering maturity as well as adolescence.

Late in 1915 we assembled twenty tests as an adolescent point scale group, arranged them chiefly in accordance with convenience of presentation, weighted them in the light of our clinical experience, and proceeded to accumulate data which should enable us thoroughly to criticize the proposed scale and profitably to revise or reconstruct it.

It is the purpose of this report to describe the initial form of the adolescent point scale, with the directions for its use, and to present certain general results from approximately 250 examinations.

It should be stated with emphasis that the point scale herein described is merely a provisional group of tests which we have no thought of standardizing, but which we propose to revise

* Reprinted from The Boston Medical and Surgical Journal, Vol. CLXXVI, No. 16, pp. 564-573, April 19, 1917.

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thoroughly on the basis of the results obtained by various examiners before we enter upon the task of securing norms for the individual tests and for a revised form of the scale.

The record blank which we have employed is reproduced below, one-half size. It consists of four pages, the tests on which are so arranged that all of those involving writing or drawing by the subject appear on page 4.

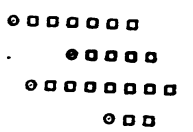
Most of the tests of the group are in principle old, although much new material has been introduced, and in a few instances the tests have been so modified as to be markedly different from their earlier forms.

For test 1 there are used, instead of the Binet pictures, three Perry pictures (Boston Edition, penny size): —

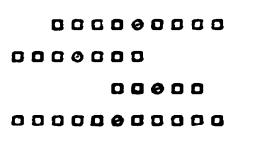
(*a*) Picture No. 893, entitled "Saved."
(*b*) Picture No. 1076, entitled "The Music Lesson."
(*c*) Picture No. 2785, entitled "The Child Handel."

For test 2 the same set of weighted cubes is employed as in the original point scale. The Healy butcher shop picture is used for test 4, in accordance with the directions given below.

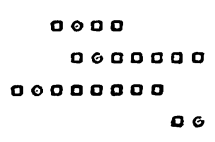
Test 12 is a new test based upon the Yerkes multiple choice method of measuring ideational efficiency.[1] The five cards which are used as materials for this test appear in Fig. 1 reduced one-half. In our set of materials the standard card for this test measures 6 by 8 inches.



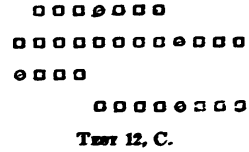
TEST 12. EXPLANATION CARD.



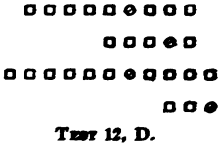
TEST 12, A.



TEST 12, B.



TEST 12, C.



TEST 12, D.

FIG. 1.

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Tests 13, 14 and 17 are taken directly from the Stanford Scale. The material for test 15 is presented on the record blank, on the fourth page of which appear seven capital letters, which are to be arranged in order of increasing total length of line. These letters appear reduced by one-half in the facsimile of the record sheet.

PSYCHOPATHIC DEPARTMENT
BOSTON STATE HOSPITAL

RECORD BLANK FOR YERKES-ROSSY ADOLESCENT-ADULT POINT SCALE EXAMINATION.

NAME _____ AGE _____ DATE OF BIRTH _____ SCORE _____
DATE _____ PLACE OF BIRTH _____ CORR. I.A. _____
EXAMINED BY _____ NATIONALITY _____ MENTAL AGE _____

TEST	CREDITS
1 Response to pictures (3 each).	
(a)	
(b)	
(c)	
2 Comparison of weights (1 each):	
(a) 6 and 9 grams.	
(b) 12 and 15 grams.	
(c) Arranging weights 3, 6, 9, 12 and 15 grams in order.	
3 Memory span for digits (1 each)	
(a) 9-2-8-7-4 6-1-8-5-3	
(b) 5-8-2-7-6-9 8-4-7-3-9-2	
(c) 3-2-8-3-1-6-5 1-7-4-9-5-2-6	
(d) 6-9-4-1-3-8-2-7 3-8-1-5-9-4-6-2	
(e) 2-9-4-7-5-8-6-3-1 4-9-2-6-7-5-1-3-8	
4 Suggestibility (5).	
1 2 3 4 5 6 7 8 9 10	
11 12 13 14 15 16 17 18 19 20	
5 Memory for unrelated sentences (1 each).	
(a) The sea is very rough. Skill comes with patience.	
(b) There are many kinds of play and work. We should always be truthful.	
(c) No one can afford to be untrue to himself. It is time for us to return.	
(d) I saw a large, black object in the sky. If he had seen the happy young face, his heart would have melted.	
(e) As we looked across the dusty, gray plain, our eyes ached. It is not possible to acquire too many good habits of mind.	

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TEST	CREDITS
6 Comparison of terms (2 each).	
(a) Milk and water.	
(b) Paper and iron.	
(c) Idleness and laziness.	
Comprehension of questions (1 each).	
(a) Why is a train safer than a steamer or an aeroplane?	
(b) Why is it better to judge people by what they do rather than by what they say?	
(c) Why should we be more ready to forgive an unkind act done in anger than one done without anger?	
(d) Why should a man accused of a crime be considered innocent until he is proved guilty?	
(e) Why is honesty the best policy?	
8 Definitions of abstract and concrete terms (2 each)	
(a) House.	
(b) Door.	
(c) Honesty.	
(d) Conceit.	
9 Appreciation of absurdities (1 each).	
(a) It has been found that the last car of a train is damaged most in case of an accident. It therefore seems best to leave off the last car.	
(b) The commissioners have resolved to build a new jail from the materials of the old jail, but they are going to keep the prisoners in the old jail until the new one is finished.	
(c) A father wrote to his son: "I enclose ten dollars. If you do not receive this letter, please send a telegram."	
(d) A man wished to dig a pit in which to bury some rubbish. He could not decide what to do with the dirt from the pit. A friend suggested that he dig the pit large enough to hold the dirt too.	
(e) A man claims that he has a telescope which is so powerful that when he looks at a church five miles away, it appears so near that he can hear the organ playing.	

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TEST	CREDITS
10 Analogies (1 each).	
(a) Pocket is to coat as closet is to	
(b) Sun is to day as moon is to	
(c) Arm is to elbow as leg is to	
(d) Known is to unknown as present is to	
(e) Whole is to part as six is to	
(f) Sunday is to Saturday as January is to	
11 Association of opposites (4).	

Wise	Never	Busy	Generous	Many
Silent	Joy	Distant	Horrid	Rough
Similar	Prompt	Lazy	Rude	Upper
Cheap	Vacant	Easy	Top	After

12 Relational test (2 each).	
(a) Middle.	
(b) Second from left.	
(c) Fourth from right.	
(d) One place to right of middle.	
13 Box test (1 each).	
(a) Large box containing two smaller boxes with one still smaller in each of the two.	
(b) Large box containing two smaller boxes with two inside of each.	
(c) Large box containing three smaller boxes with three inside of each.	
(d) Large box containing four smaller boxes with four inside of each.	
14 Ingenuity (7).	
(a) If you were asked to get seven pints of water from a well, and were given a three-pint vessel and a five-pint vessel, could you measure out exactly seven pints without guessing at the amount, if you began by filling the five-pint vessel first? (3)	
(b) Five and seven-pint vessels to get eight pints, filling first the five-pint vessel? (2)	
(c) Four and nine-pint vessels to get seven pints, beginning by filling the four-pint vessel? (2)	

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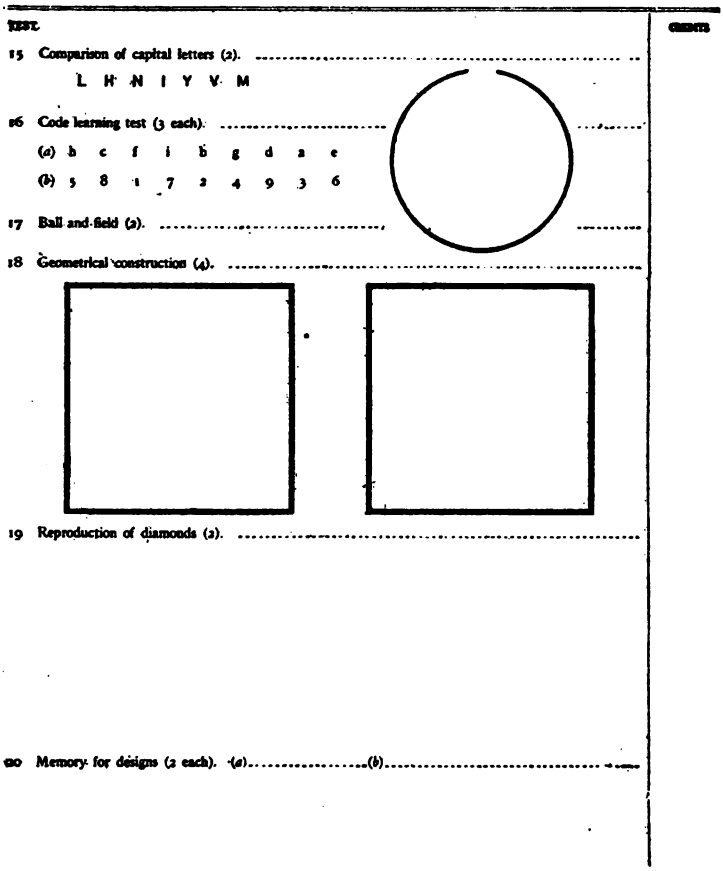

For the code-learning test an explanatory drawing and letter code with the word *nor* written in symbols is first presented by the experimenter.* Then the cards, reproduced half size, as Fig. 2, are presented.

a	f	g
b	e	h
c	d	i

TEST 16, A.

1	7	8
6	2	9
5	4	3

TEST 16, B.

FIG. 2.

* This appears in the directions for examination.

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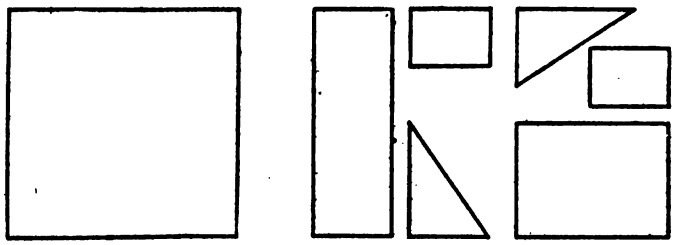
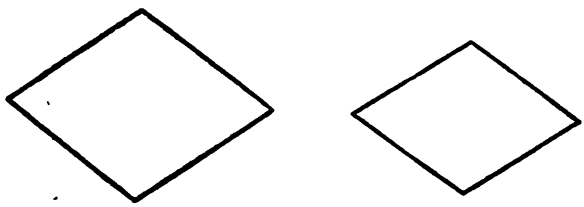
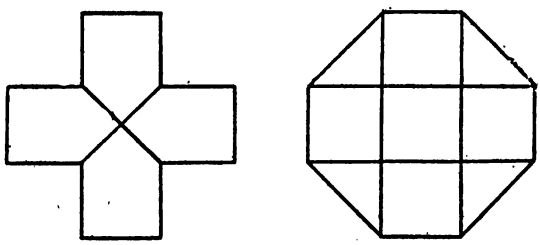
Test 18 was devised by the writers as a visual construction test, the card for which appears at the top of Fig. 3, reduced one-half. This figure likewise presents the materials for tests 19 and 20, both of which are new as to material, old in principle.



Test 18.



Test 19.



A B

Test 20.

Fig. 3.

The full directions for the making of an adolescent point scale examination follow. They are intentionally brief and have already served their purpose as guides in a preliminary application of the scale by several experienced examiners.

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Brief Preliminary Directions for using the Adolescent-adult Point Scale.

These directions will suffice for experienced examiners only.

The scale is to be used only for individuals whose intellectual ability appears to be equal to or greater than that of the twelve-year-old child.

The order of tests need not be followed strictly if good reasons for change appear.

This scale has not yet been standardized and is subject to revision. Norms are to be established.

It is desirable to keep very full records of responses, in order that the tests may be criticized, modified and standardized.

Materials.

Stop-watch.

Test 1. Three Perry pictures ("Saved," "The Music Lesson" and "The Child Handel").

Test 2. Set of five weighted cubes, 3, 6, 9, 12 and 15 grams.

Test 4. Picture of butcher shop (Healy).

Test 12. Five cards for relational test.

Test 16. Two cards for code test.

Test 18. Cards for geometrical test.

Test 19. Card for reproduction of diamonds.

Test 20. Card for memory for designs.

Directions.

Test 1. Response to Pictures (Maximum Credit, 9 Points).

Three Perry pictures are to be used in this test: (*a*) "Saved;" (*b*) "The Music Lesson;" (*c*) "The Child Handel."

Picture (*a*) is placed before the subject, and the examiner says: "Please describe this picture for me as well as you can." As soon as the subject has completed the description, if interpretation has not already been given, ask: "What does it mean?"

Give credit as follows for each picture: For excellent description (at least eight features correct) give 2 points; same, with correct interpretation, 3 points. For good description (four to seven features correct) give 1 point; same, with correct interpretation, 2 points. For meager description (only two or three features correct), with correct interpretation, give 1 point. For simple enumeration allow no credit.

Time for each picture, two minutes.

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Test 2. Comparison of Weights (Maximum Credit, 3 Points).

Have the five weights arranged in order, so that they can be presented quickly and without trial. Then present as part (*a*) of the test the weights 6 and 9 grams, saying: "Tell me, please, which is the heavier of these two blocks." Similarly (*b*), present the 12 and 15 gram blocks. (*c*) Present the five weighted blocks, saying: "Please arrange these in order of increasing weight, the lightest at one end, the heaviest at the other."

To avoid the extreme risk of guesses, give two trials for parts (*a*) and (*b*). Give only one trial for part (*c*), but let the second trial for parts (*a*) and (*b*) follow part (*c*).

It is especially important in this test that the examiner should not suggest the lifting of the weights or any other method of comparison.

Give credit as follows: For (*a*) give 1 point if the weights are immediately compared by lifting and if correct judgments are given in both trials. Give no credit if a mistake is made in either trial. Likewise, for part (*b*) give 1 point credit for correct and immediate judgment on the basis of lifting, allowing no credit if a mistake is made in either trial. For (*c*), give 1 point credit if the weights are arranged in correct order. Allow no credit if a mistake is made.

Time for (*a*), thirty seconds; (*b*), thirty seconds; (*c*), one minute.

Test 3. Memory Span for Digits (Maximum Credit, 5 Points).

Say to the subject "Please listen carefully, and as soon as I stop, repeat just what I have said."

	Trial 1.	Trial 2.
(*a*)	9–2–8–7–4	6–1–8–5–3
(*b*)	5–8–2–7–6–9	8–4–7–3–9–2
(*c*)	7–2–8–3–1–6–5	1–7–4–9–5–2–6
(*d*)	6–9–4–1–3–8–2–7	3–8–1–5–9–4–6–2
(*e*)	2–9–4–7–5–8–6–3–1	4–9–2–6–7–5–1–3–8

Present the digits orally at the rate of two per second, enunciating very clearly and distinctly. If the subject fails to reproduce a given group, present the group containing the same number of digits under Trial 2. If the subject fails in this trial, proceed no further with the test; but if, instead, success is attained, present in like manner the next larger group of digits

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under Trial 1, and continue according to the above directions until the subject has failed in both trials for a given group of digits.

Give 1 point credit for the perfect reproduction, in either Trial 1 or Trial 2, of each of the five parts of the test.

Time, two minutes.

Test 4. Suggestibility (Maximum Credit, 5 Points).

Present the picture of a butcher shop (Healy) to the subject, with the statement: "I am going to show you a picture for ten seconds. Please look at it carefully so that you can answer some questions I shall ask about it." Allow the subject ten seconds for the examination of the picture, then remove it and ask as rapidly as possible the following twenty questions, recording the subject's responses thus: Let + indicate correct statement or resistance; —, incorrect statement or acceptance of suggestion. The questions involving suggestion are indicated by S.

1. Did you see a woman and a man?
S. 2. Were there two children with the woman?
3. Did you see the sausages in the butcher's hand?
S. 4. Did you notice the electric light over the counter?
5. Was there a dog in the shop?
S. 6. Did you see the open door of the shop?
7. The woman had a basket on her arm, did she not?
S. 8. How many oranges were in the basket?
9. Did you see the chopping block?
S. 10. And the stool behind the butcher?
11. Were the scales hanging up?
S. 12. Was the cash register on the counter?
13. The knife in the butcher's hand was a large one, was n't it?
S. 14. Did you notice the people on the street?
15. Had the little girl bundles in her arms?
S. 16. Was her hair-ribbon red or blue?
17. Did you see the ice box (refrigerator) behind the butcher?
S. 18. Was the butcher's hat black?
19. Was the floor clean?
S. 20. How many windows did you see?

Give 5 points credit if all the suggestions are resisted either by correct statement or by the statement "I don't know." Give 4 points if nine of the ten suggestions are resisted. Give 3 points if eight of the ten are resisted. Give 2 points if seven of the ten are resisted. Give 1 point if six of the ten are resisted.

Time, fifteen seconds for each question.

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Test 5. Memory for Unrelated Sentences (Maximum Credit, 5 Points).

Say to the subject, "Now please listen very carefully, and after I stop, repeat just what I have said." Then present the following sentences in order, with almost no pause between the two sentences of a given part: —

(*a*) The sea is very rough. Skill comes with patience.

(*b*) There are many kinds of play and work. We should always be truthful.

(*c*) No one can afford to be untrue to himself. It is time for us to return.

(*d*) I saw a large black object in the sky. If he had seen the happy young face his heart would have melted.

(*e*) As we looked across the dusty gray plain our eyes ached. It is not possible to acquire too many good habits of mind.

Give 1 point credit for precisely correct reproduction of each part. Give no credit if a single error is made, unless it be clearly a case of a misunderstood word. Allow only one trial.

Time, fifteen seconds for each part.

Test 6. Comparison of Terms (Maximum Credit, 6 Points).

Say to the subject, "I wish you would compare, as well as you can, milk and water; that is, tell all the important likenesses and differences you can think of." Similarly, present as part (*b*) the terms "paper" and "iron"; as part (*c*), the terms "idleness" and "laziness."

Give 2 points credit for a comparison involving four or more correct and important elements in case of (*a*) or (*b*), and the essential differences in case of part (*c*).

Give 1 point for two or three correct and important elements in case of (*a*) or (*b*), and the correct defining of either term in case of (*c*).

Time, two minutes for each part.

Test 7. Comprehension of Questions (Maximum Credit, 5 Points).

Say, "I shall now ask you some questions. Please answer them as satisfactorily as you can."

(*a*) Why is a train safer than a steamer or an aeroplane?

(*b*) Why is it better to judge people by what they do rather than by what they say?

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(*c*) Why should we be more ready to forgive an unkind act done in anger than one done without anger?

(*d*) Why should a man accused of a crime be considered innocent until he is proved guilty?

(*e*) Why is honesty the best policy?

Give 1 point credit for correct answers or such as in your judgment show fair insight, judgment and reasoning ability. Disagreement with the answer suggested by the form of the question should receive credit if logically supported. Differences from the conventional type of answer may indicate superiority, and should, if reasonable, receive full credit. It is important to grade closely.

Time, two minutes for each part.

Test 8. Definitions (Maximum Credit, 8 Points).

Say to the subject, "I wish you to define, as accurately as you can, the following words." Or, if the subject is comparatively illiterate, say, "I wish you to tell me what these words mean: (*a*) house; (*b*) door; (*c*) honesty; (*d*) conceit."

Give 2 points credit for an excellent form of definition containing the essential elements, whether or not conventional. Give 1 point credit for a definition which involves enough correct elements for the certain identification of the concept.

Time, one minute for each term.

Test 9. Appreciation of Absurdities (Maximum Credit, 5 Points).

Say to the subject: "I am going to read some sentences to you, and I wish you to tell me what you think of them."

The examiner must be especially careful not to suggest that the sentences are foolish or absurd.

(*a*) It has been found that the last car of a train is damaged most in case of an accident. It therefore seems best to leave off the last car.

(*b*) The commissioners have resolved to build a new jail from the materials of the old jail, but they are going to keep the prisoners in the old jail until the new one is finished.

(*c*) A father wrote to his son: "I enclose $10. If you do not receive this letter, please send me a telegram."

(*d*) A man wished to dig a pit in which to bury some rubbish. He could not decide what to do with the dirt from the pit. A friend suggested that he dig the pit large enough to hold the dirt too.

(*e*) A man claims that he has a telescope which is so powerful that when he looks at a church 5 miles away, it appears so near that he can hear the organ.

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Give 1 point credit for each detection and clear statement of an absurdity. Grade closely.

Time, one minute for each part.

Test 10. Analogies (Maximum Credit, 6 Points).

"If I should say, 'Man is to boy as woman is to ——', how would you complete the sentence?" If the subject says, "girl," proceed with the next example. If not, supply the missing word. "Boat is to water as train is to ——." Again give the subject an opportunity to complete the sentence, and if he is unable to do so, supply the missing word.

Having made clear the nature of the test, proceed to present in order the following six analogies: —

(*a*) Pocket is to coat as closet is to ——.
(*b*) Sun is to day as moon is to ——.
(*c*) Arm is to elbow as leg is to ——.
(*d*) Known is to unknown as present is to ——.
(*e*) Whole is to part as six is to ——.
(*f*) Sunday is to Saturday as January is to ——.

Give 1 point credit for each correct response. Grade carefully and closely. Time for each part, thirty seconds.

Test 11. Association of Opposites (Maximum Credit, 4 Points).

Say to the subject, "I am going to read off a list of words, and as I read them I wish you would give me the opposite of each word, like this: high—low; large—small; hard—soft. Now we shall begin."

Wise.	Never.	Busy.	Generous.	Many.
Silent.	Joy.	Distant.	Horrid.	Rough.
Similar.	Prompt.	Lazy.	Rude.	Upper.
Cheap.	Vacant.	Easy.	Top.	After.

Give 4 points credit for correct response to each of the twenty words. Give 3 points credit if not more than three mistakes appear. Give 2 points credit if not more than six mistakes appear. Give 1 point credit if not more than 9 mistakes appear.

Time, three minutes.

Test 12. Relational Test (Maximum Credit, 8 Points).

Explain thus to the subject the nature of the test: "I am going to show you a card with four lines of squares and circles on

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it." Then show the explanation card with the circle in each case as the first symbol at the left and ask the subject, "What is the relation of the circle to the squares on this card?" If he does not perceive that it is always the first symbol at the left, explain this relation to him. Make perfectly sure that the idea of uniform relationship, that is, the same relationship for each of the four lines, is grasped. Having thus made plain the nature of the test, present in turn cards representing the four relations of symbols (Fig. 1).

(*a*) Middle.
(*b*) Second from left end.
(*c*) Fourth from right end.
(*d*) One place to the right of middle, or always two more squares on the left of the circle than on the right.

Give 2 points credit for each part for which the relation is discovered and correctly formulated. Give 1 point credit if the relation is so perceived that it can be reproduced in new groups of symbols, but cannot be expressed in words.

Time, two minutes for each part.

Test 13. Box Test (Maximum Credit, 4 Points).

"Please tell me how many boxes you would have if I gave you: (*a*) A large box with two smaller boxes inside of it, and inside of each of the smaller boxes one still smaller. (*b*) A large box with two smaller boxes inside of it, and inside of each of the smaller boxes two still smaller. (*c*) A large box with three smaller boxes inside of it, and inside of each of the smaller boxes three still smaller. (*d*) A large box with four smaller boxes inside of it, and inside of each of the smaller boxes four still smaller."

Give 1 point credit for correct response in case of each part.

Time, one minute for each part.

Test 14. Ingenuity (Maximum Credit, 7 Points).

Say to the subject, "I am going to give you some practical problems. If you wish to, you may use this pencil and paper in working them out." Then present: (*a*) "If you were asked to get 7 pints of water from a well and were given a 3-pint vessel and a 5-pint vessel, could you measure out exactly 7 pints without guessing at the amount, if you began by filling the 5-pint vessel first? You understand that you have no third vessel, but if you want to, you can throw out water."

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If the subject fails to solve this problem in three minutes explain it to him in the following way: "Fill the 5-pint vessel. Then from it fill the 3-pint vessel. Now, empty the 3-pint vessel. Pour the 2 pints remaining in the 5-pint vessel into the 3-pint vessel and refill the 5-pint vessel. As a result, you will have precisely 7 pints of water in the two vessels."

After the correct solution of (*a*), either by the subject or with the aid of the experimenter, present as (*b*): "If you were asked to get 8 pints of water and were given a 5-pint vessel and a 7-pint vessel, could you measure out exactly 8 pints of water without guessing at the amount, if you began by filling the 5-pint vessel first? (*c*) If you were asked to get 7 pints of water and were given a 4-pint vessel and a 9-pint vessel, could you measure out exactly 7 pints without guessing at the amount, if you began by filling the 4-pint vessel first?"

Make sure that the problems are understood, so far as the subject is capable of understanding them.

Give 3 points credit for correct and independent solution of problem (*a*). Give 2 points credit for correct solution of problem (*b*), either with or without explanation of problem (*a*). Give 2 points credit for problem (*c*), either with or without explanation of problem (*a*).

Time, three minutes for part (*a*); two minutes for part (*b*); two minutes for part (*c*).

Test 15. Comparison of Capital Letters (*Maximum Credit, 2 Points*).

Present to the subject on page 4 of the record sheet the capital letters L, H, N, I, Y, V and M, saying: "Please look at these letters carefully and arrange them in order of the length of line which is needed to make them. You see if you straighten out the M it would make a much longer line than the I." Make sure that the subject understands what is meant. Then give him a pencil and have him write the letters on the record sheet, in the space provided, in what he conceives to be the correct order.

Give 2 points credit for the correct order, — I, L, Y, V, H, N, M. Give 1 point if either of the pairs of letters L, Y or H, N is reversed. Give no credit if both pairs are reversed, and no credit for anything poorer.

Time, two minutes.

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Test 16. Code Learning Test (Maximum Credit, 6 Points).

Explain the purpose and meaning of the code test by drawing the following figure and indicating to the subject the symbols for the word "nor."

j	n	k
q	o	p
m	r	l

After you are sure that the subject understands the nature of the test, say, "I am now going to show you a figure in which different letters are used. I shall let you study it for twenty seconds; that is a very short time. Please try to learn it so that you can write the symbol for each letter."

Then present the appropriate card for code (*a*), allow the subject twenty seconds for observation, and immediately thereafter have him reproduce the symbols for the letters as given on the record sheet under the test.

This part having been completed, present in similar fashion the card for part (*b*), the number code. Allow twenty seconds for the learning of the code. Then have the subject reproduce the symbols for the digits as they appear on the record sheet.

Give 3 points credit for correct reproduction in case of each part. Give 2 points credit if one error is made. Give 1 point credit if not more than three errors are made.

Time for reproduction of each part, one minute.

Test 17. Ball and Field (Maximum Credit, 2 Points).

Present to the subject the broken circle on page 4 of the record sheet, saying, "If you were told that a ball had been knocked into this field and lost in the grass, and you had no notion as to the direction from which it came, or where it may have landed, how could you most quickly and easily find it? Show me on this paper what path you would follow in searching for it." Have the subject trace a path in the circle which appears on page 4 of the record sheet.

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Give 2 points credit for an inward or outward spiral or for a systematic back and forth plan (straight or curved path). Give 1 point credit for concentric circles or for radii or diameters systematically followed. Give no credit for anything poorer.

Time, two minutes.

Test 18. Geometrical Construction Test (*Maximum Credit, 4 Points*).

Place before the subject the geometrical construction card, saying, "Here is a drawing with a number of parts or pieces. If they are properly fitted together they will make a square. Now please take this pencil and show me how the parts can be fitted together to just fill this square." (One of the squares on page 4 of the record sheet.)

If the subject does not get the parts properly arranged on the first attempt, allow him to try again in the second square on the record sheet.

Give 4 points credit for correct arrangement of the parts on first trial. Give 2 points credit for correct arrangement on second trial. Give 1 point credit if all parts are correctly placed, except the two triangles, in the second trial.

Time for first trial, two minutes; for second trial, two minutes.

Test 19. Reproduction of Diamonds (*Maximum Credit, 2 Points*).

Present squarely before the subject, with the base of the card toward him, the pair of diamonds and say, "I wish you to copy these two figures very carefully and accurately." The reproduction should be made on page 4 of the record sheet in the proper space with a pencil. The subject should not be allowed to move the paper about.

Give 2 points credit for approximate correctness in form and size. Give 1 point credit for easily identifiable reproduction of form, but failure to reproduce the relative sizes.

Time, one minute.

Test 20. Memory for Designs (*Maximum Credit, 4 Points*).

Say to the subject, "I am going to show you a pair of drawings. After you have looked at them for ten seconds I shall take them away and ask you to draw both of them from memory. Look at them very carefully." Then present for ten seconds the

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card bearing the two designs. Have the subject reproduce the designs with pencil in the space provided on page 4 of the record sheet.

Give 2 points credit for correct and accurate reproduction of (*a*) or (*b*). Give 1 point credit for (*a*) or (*b*) if a minor imperfection appears, such as the omission of the cross lines or their introduction in the wrong figure.

Time, two minutes.

General Results of Application of Scale.

To the following expert examiners who have generously aided us we take pleasure in expressing our obligation and our thanks: Drs. Helen T. Woolley, Thomas H. Haines, R. H. Sylvester, Josephine N. Curtis, Mabel R. Fernald, Frederick L. Wells, Miss Rose S. Hardwick and Mr. Willard L. Smith.

As it is our intention to use our data (both measurements and criticisms) as the basis for a revision of the scale which will be reported later, we shall present in this connection only the ranges of scores and the averages for various groups of subjects. These will serve examiners temporarily as rough norms or standards to regulate expectation.

For a group of 23 women in the reformatory at Bedford Hills, New York, the adult scores ranged from 14 to 61 points. The relation of these scores to the pre-adolescent scores is exhibited in Table 1.

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TABLE 1. — *Bedford Hills Group (Dr. Fernald.)*

AGE.	Adult Score.	Pre-adolescent Score.
29.3,	14	62
19.5,	16	57
32.2,	18	65
22.2,	20	67
21.2,	21	58
19,	22	63
37.6,	24	64
16,	27	59
16.7,	27	74
26.6,	28	61
16.7,	29	70
21.7,	31	66
24.6,	34	75
20.9,	35	74
25.7,	36	62
17.5,	36	77
19.3,	39	72
29.2,	49	80
21,	50	90
22.6,	52	81
18.3,	55	82
18,	56	85
22,	61	86
Averages for 23 cases,	34	71

Adult score=.48 of pre-adolescent score.

Similarly the range for a group of 33 high-grade pupils in the School for the Feeble-minded at Waverley, Mass., is 18 to 59 points. Few of these individuals would be in the school except for affective peculiarities and resulting delinquencies. Table 2 presents the scores for the group.

It is to be noted that the ratios of the adult score to the pre-adolescent score are nearly the same, — .48 : 1.00 for the Bedford Hills group, and .51 : 1.00 for the Waverley group. The conclusion indicated is that for subjects of medium to poor intelligence the adult score will be approximately one-half the pre-adolescent score.

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TABLE 2. — *Waverley Group (Dr. Curtis).*

AGE.	Adult Score.	Pre-adolescent Score.
25.3,	54	80
32.8,	56	82
16.7,	59	84
26.7,	20	62
38,	18	68
19.6,	26	71
30.8,	27	72
26.9,	27	79
19.7,	52	83
20.9,	28	73
24.3,	28	65
28.1,	29	67
25.6,	32	80
18.9,	32	77
23,	32	70
25.3,	32	69
19.6,	33	72
25,	36	73
23.2,	40	72
25.3,	40	79
24.3,	40	73
17,	41	74
25.8,	41	84
24.5,	41	73
21.8,	42	79
20.6,	42	77
26.7,	44	89
22.3,	45	89
20,	47	85
17,	47	83
20.7,	47	86
17,	49	83
18.6,	54	92
Averages for 33 cases,	39	77

Adult score = .51 of pre-adolescent score.

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A non-selected group of fifteen grammar school pupils, aged 12.6 to 16.4 years, scored from 32 to 70 points. The numbers are not large enough to supply safe age-norms.

Twenty-five working children, aged fifteen to sixteen years, obtained scores from 24 to 72.

A group of 80 college students and professionally trained persons yields a range of 64 to 98 points.

The following averages supplement the ranges already given: —

Average score for 15 working children, fifteen to sixteen years, 45 points.

Average score for 15 nurses, 52 points.

Average score for 15 college students, 86 points.

Average score for 15 physicians and teachers, 90 points.

Our results indicate that Tests 12 and 14 are unsatisfactory in their present form, and should be modified for use in an adolescent-adult point scale.

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DISTINCTIVE FEATURES IN PSYCHOLOGICAL TEST MEASUREMENTS MADE UPON DEMENTIA PRÆCOX AND CHRONIC ALCOHOLIC PATIENTS.*

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Thus far psychological methods of measuring intelligence have been developed almost wholly according to the needs of work with the feeble-minded. However, problems suggesting mental measurement are also frequently presented by psychotic cases. A feeble-minded basis for the disease is often suspected. Some measurement of mental deterioration would in other instances be of distinct value. Numerous attempts to employ the routine tests for feeble-mindedness in dealing with such cases have proved their inadequacy; it seems clear that for use with psychotic cases a group of tests especially organized for the purpose is necessary. A study of the general problem of mental measurement of psychotic patients was therefore proposed to the writer by Dr. R. M. Yerkes as part of the psychological research program at the Boston Psychopathic Hospital. The present paper is a first report on this work.

Such a group of tests must evidently be adapted to meet a wide variety of conditions. The problem presented the psychological examiner by a psychotic patient may be found very different at different stages of the disease. Different mental diseases may require largely different methods; it may appear that wholly different groups are needed for special diseases or stages; or the same disease may conceivably be discovered to affect different individuals in varying ways to such an extent as to make the use of any closely organized routine examination impossible. But a mental disease also shows many important features whose right to play a part in the determination of a mental rating (supposed to take account only of intelligence) could very well be questioned. These features are in fact often transitory, and symptoms merely of a particular stage of the disease. No examination can of course be made unless the

* Paper presented at Conference on Methods of Psychological Examining, Oct. 28, 1916, Waverley, Mass., being Contribution of the Massachusetts Commission on Mental Diseases, whole number 182 (1917.2). The previous contribution, No. 167 (1917.1) was by R. M. Yerkes and C. S. Rossy, entitled "A Point Scale for the Measurement of Intelligence in Adolescent and Adult Individuals," to appear in the Boston Medical and Surgical Journal, April, 1917.

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patient is quiet and co-operative. But he may still be negativistic; may be too absorbed with his delusions to give adequate attention to the tests; may perhaps be hallucinated; may be in an emotional state which prevents satisfactory work. Means of taking account of such factors must be found, or tests used which are relatively little affected by them. The situation is extremely complex, and as yet little analyzed so far as the problems of the psychological examiner are concerned. Under these circumstances any direct attack upon either of the two questions mentioned above, of previous mental level and of present mental loss, was clearly impossible in the first handling of material. A preliminary study to give a general survey and orientation, and discover the best methods of approach, was necessary.

The work here reported was planned as such a first sampling of materials and trial of methods. The cases were examined with the point scale plus certain supplementary tests (mostly of the Healy group). The cue as to method of handling data was taken from the problem which at once presents itself when, in practical work, such a routine examination is given to a group of psychotics. A large proportion grade as feeble-minded. In a given case the question immediately arises as to whether the low grade is due to the mental disease or to primary amentia. The present study is concerned with this question. A means of answer should be obtained by comparing the results given by a group of individuals who had developed to the adult level of intelligence, but now because of mental disease grade as feeble-minded, with results from individuals of like mental age known to be cases of primary amentia. Such a comparison might bring out some features characteristic of the psychotic group, and suggest means by which still more distinctive results might be obtained.

The problem of the paper, as thus set, required psychotic cases grading as feeble-minded and presenting histories indicative of the previous attainment of adult intelligence. The selection was finally limited to examinations yielding mental ages from eight through twelve years by the point scale. Illiterate cases, those with a language handicap, also some whose condition at the time of examination was such as to make its validity questionable, were excluded. The elimination of certain cases whose histories suggested a feeble-minded basis for the psychosis would also have been desirable theoretically. The majority of these

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had already been excluded from the tables by the requirement that, in spite of the diseased condition, the patient must grade above eight mentally, and by the rejection of illiterates. No further satisfactory criteria for the elimination of such cases could be found. The tables doubtless include a few patients originally subnormal. But this cannot do more than render differences less apparent. The large majority of the histories give indications of a previous mentality well up to normal. As a whole, then, the cases make up a group which had developed clearly above a feeble-minded level.

Of the total group, 50 had been diagnosed as dementia præcox. Their average age was thirty, the ages ranging from fifteen to fifty-five; their average mental age was 10.5. Twenty-five were chronic alcoholics. This sub-group was too small to have much significance by itself, but appeared of decided interest for purposes of comparison with results from the dementia præcox cases. The average mental age was practically the same, 10.9. But the average chronological age was twelve years more, — forty-two; the range was from twenty-five to sixty-three years. More important, however, was the difference in time of examination with relation to the course of the disease. The majority of the dementia præcox cases at the Psychopathic Hospital appear there at the time of first onset of the psychosis; though the disease has presumably been in progress for a considerable period previous to this, its actual disintegrating effect upon the mentality has only recently become noticeable. But the active psychotic symptoms are numerous and varied. The patient is probably deluded, perhaps hallucinated; shows emotional abnormalities. With the chronic alcoholic the situation is largely reversed. He is not brought to the hospital until his condition has gone from bad to worse as the result of years of dissipation. The number of active symptoms, however, is much less, the chief evidence of psychosis being the gradual deterioration.* Any agreement between the findings on the two groups will thus be of decided interest. It would suggest that the problems of test measurement may not be so different with the different types of psychoses as at first would appear likely; that largely similar methods of attack might then be used, at least in the first handling of materials.

Differential features in the results given by these psychotic cases as against results from the feeble-minded were sought in

* Only cases diagnosed simply as chronic alcoholism were used; diagnoses of alcoholic hallucinosis, alcoholic delusional insanity, etc., were excluded.

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four ways, — first, the average psychotic performance on each test of the scale was compared with average feeble-minded performance;* second, the average psychotic and the average feeble-minded showings on the scale were compared with the average normal; third, the amount of scatter about their mean shown by one group of the psychotics was compared with the scatter shown by an equal number of feeble-minded cases; fourth, the showing of the psychotic patients on the supplementary tests was compared with the average performance on these tests.

In order to get at possible distinctive reactions to the separate tests of the scale, the score made by each psychotic case on a given test was compared with the average score made by a group of feeble-minded cases rating at the same mental age. If, for instance, a dementia præcox patient making a mental age of 11.8 on the point scale scored five points on test 19, this would be compared with the average score — 2.6 — on test 19 made by defective cases giving a mental age of 11.8. The dementia præcox is then given plus 2.4 on this test. And the algebraic sum of plus and minus variations credited the 50 dementia præcox patients on test 19 shows the tendency of the group on this test. These results, expressed as per cents. of the average feeble-minded score, which the psychotics make on each test of the point scale, are presented in the following table: —

Test.†	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Dem. Præ., . .	1.00	1.02	.98	1.10	1.05	(1.21)‡	1.00	.89	.86	1.02
% bal. + or —, .	—	+24	1—	20+	36+	(4—)	12+	8+	36—	4+
Alcoholics, . .	1.00	.93	.97	1.00	1.04	(1.15)‡	.86	1.12	.96	1.04
% bal. + or —, .	—	16—	—	4+	20+	(12+)	60—	28+	12—	20+

* Work done by Dr. J. N. Curtis on 200 cases at the Waverley School for the Feeble-minded.

† The tests of the point scale are as follows: (1) chooses prettier of three pairs of pictures; (2) sees picture lacks arms, nose, etc.; (3) compares lines and weights; (4) memory span for digits; (5) counts backward 20–1; (6) memory span, sentences; (7) reaction to Binet pictures; (8) arranges weights in order; (9) compares apple and banana, etc.; (10) defines spoon, chair, etc.; (11) line suggestion test; (12) copies square and diamond; (13) free association for three minutes; (14) writes sentence containing Boston, money, river; (15) comprehends questions — What would you do if you missed your train, etc.; (16) draws Binet figures from memory; (17) sees absurdities; (18) puts dissected sentences together; (19) defines charity, obedience, etc.; (20) completes analogies — oyster is to shell as banana is to, etc.

‡ Due largely to a change in scoring; of only comparative significance.

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Test.	11.	12.	13.	14.	15.	16.	17.	18.	19.	20.
Dem. Præ., . .	.96	.99	.83	.95	.98	.52	.88	1.23	1.55	1.01
% bal. + or —, .	24—	36+	8—	26—	20+	40—	28—	—	38+	16—
Alcoholics, . .	1.02	.86	.95	1.04	1.19	.32	1.30	1.15	1.37	1.11
% bal. + or —, .	36+	12—	—	12—	60+	84—	52+	20—	52+	12+

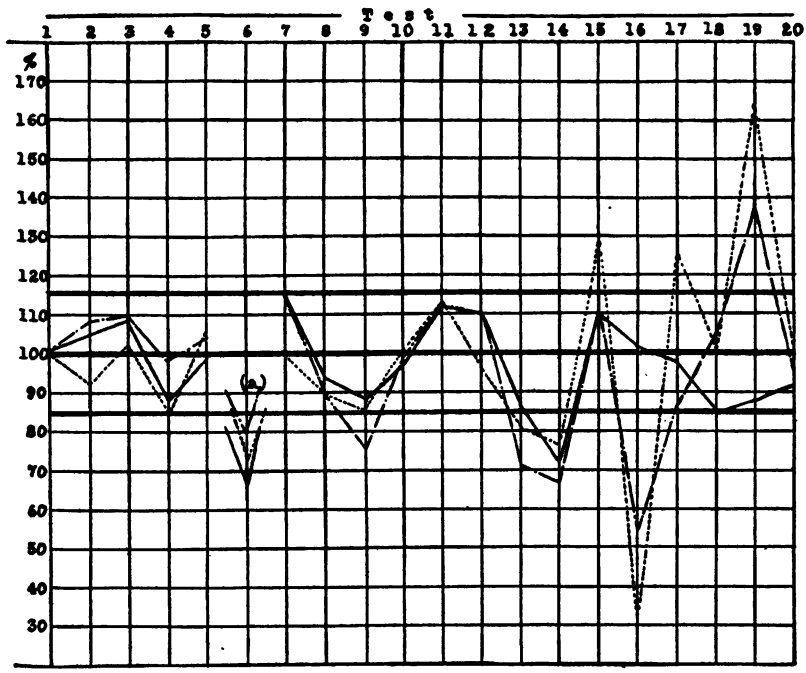
With the small number of cases used, only marked variations can be considered significant. Variations over 15 per cent. should, however, be well out of the range of purely chance distribution; all such variations are underlined. As a rough measure of the constancy of the tendencies the balance of plus and minus signs is used, and a balance of more than 30 per cent. one way or another again underlined.

Point Scale Tests.

Variation from score made by average normal of the same mental age given by groups:

——————— feeble-minded.
— - — - — - — dementia præcox.
..... chronic alcoholics.

Variations given as per cents. of average normal score.
(a) Due largely to a change in methods of scoring; of only comparative significance.



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The interesting features of the results are the surprising difficulty (53 and 32 per cent. of the average for the primary aments) shown by both groups of psychotics in test 16, drawing the Binet figures from memory, and the marked superiority (1.55 and 1.87 per cent.) over the feeble-minded cases in test 19, defining abstract words.* The dementia præcox show a distinct though less striking peculiarity in their slowness of free association; the alcoholics are separated off from the dementia præcox by their more ready response to "comprehension of questions" and to "absurdities."

The second question taken up was as to whether the psychotics showed consistent differences, as compared with the feeble-minded, in their variations from the average normal of the same mental age.† The data have been handled as before, except that the average normal instead of the average feeble-minded score is taken as a basis. And the results are graphed in order to make them more readily grasped as a whole. Variations over 15 per cent. are here marked off by the two double lines.

The feeble-minded cases show only one variation over 15 per cent. This is on test 14 (making a sentence containing Boston, money, river); their score is 73 per cent. of normal. On the other hand, the dementia præcox give five such variations. They score 77 per cent. of normal on test 9 (comparisons), 71 per cent. on test 13 (free association for three minutes), 67 per cent. on test 14, 54 per cent. on test 16 (drawing Binet figures from memory), 1.38 per cent. on test 19 (definition of abstract words). The alcoholics average 77 per cent. on test 13, 1.29 per cent. on test 15 (comprehension of questions), 32 per cent. on test 16, 1.25 per cent. on test 17 (understanding absurdities), 1.64 per cent. on test 19, — again five variations over 15 per cent. The psychotics thus show both more frequent and greater variations from the average normal of the same mental age than do the feeble-minded.‡ Furthermore, the results from the two groups of psychotic cases agree surprisingly.

So far the paper has dealt with the average tendencies of the

* It is interesting to note that this test is (Table 30, p. 123 of "A Point Scale for measuring Mental Ability") one of the most conclusive in its indication of good mental level with normal children. There is no score till the ninth year, and the averages then run: .9, 1.6, 1.9, 3.3, 3.9, 4.0, 4.0 for the years nine to fifteen, inclusive. Its emergence again, in a study of psychotics, as a test of special diagnostic value, has made it seem worth while to try to develop it further; a special supplementary test of this nature is now being tried out.

† The data of Table 30 of "A Point Scale for measuring Mental Ability" were here used.

‡ It will be observed that the upper end of the scale is the differential portion. The first twelve tests show little sensitiveness.

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two groups. These averages have been found to differ markedly in certain respects from the average for feeble-minded individuals of the same mental age. But a greater variation around their averages might also be expected to characterize the psychotics, due to different stages of the disease in which different patients might be at the time of examination, and different effects which it might have on different individuals or other similar causes. Some estimate of the amount of such scattering appeared worth attempting. The 25 alcoholics were therefore paired each with a primary ament whose score totaled exactly the same number of points, and the average of each group for each test was found. The mean variation of each group from its own average was then worked out. Due probably to such causes as those mentioned above, the alcoholics show 17 per cent. more fluctuation about their group average than do a comparable group of feeble-minded cases.*

A fourth attempt to distinguish the examinations given by the psychotic cases was made by a study of the reactions to certain supplementary tests. These were, for the most part, as has been said, of the Healy group. Usually not all the tests were given; the following were, however, tried often enough to make the results interesting.†

Picture form board (foal and mare — Healy). Dementia præcox, 32 cases; alcoholic, 17. Each group averaged two more moves with the triangles. The dementia præcox also took two more main moves. There was no clear difference in time taken to do the test.

Construction puzzle A (Healy). Dementia præcox, 43 cases; alcoholics, 22. The psychotics average a move less, but take fifteen seconds longer.

Construction puzzle B (Healy). Dementia præcox, 41 cases; alcoholics, 20. The dementia præcox took five more moves, thirty seconds more; the alcoholics two more moves, one minute longer.

* The 25 alcoholics showed a total variation from average normal of the same mental age 32 per cent. greater than did the strictly comparable 25 cases of primary amentia.

The distribution of the scores within the scale clearly is often quite as important as the mental age or total rating. The writer would like to see all reports of point scale results include some statement of such "irregularity." We might expect the report on a feeble-minded case to read, say, "Mental age, 11.8; irregularity, 12 points," where the report on an alcoholic would be, "Mental age, 11.8; irregularity, 18 points." But of course there are at present no data for the interpretation of such findings. The subject of distribution of score within the examination has certainly not received the attention it deserves.

† The comparisons are with average performance for the same mental age, as given in norms for these tests recently worked out at the hospital.

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Apperception picture puzzle (Healy). Dementia præcox, 42 cases; alcoholics, 22. The psychotics averaged one less correct move; the dementia præcox took thirty seconds, the alcoholics one minute thirty seconds more time.

Visual verbal memory passage (Healy). Dementia præcox, 28 cases; alcoholics, 15. The psychotics averaged two less details, took fifteen seconds less.

Auditory verbal memory passage (Healy). Dementia præcox, 32 cases; alcoholics, 19. The dementia præcox gave back two less details, the alcoholics one less. Time showed no clear variation.

Learning test — arbitrary associations (Healy). Dementia præcox, 32 cases; alcoholics, 19. The psychotics average two less details.

The special contribution of the supplementary tests to the examination is made by the tests of procedure (the picture form board and construction puzzles; also, if so used, the apperception picture puzzle). The tests of the scale score merely end product, not method. The peculiarity of method — or lack of method — shown by the psychotics on these procedure tests was often the most distinctive feature of the examination. This is not sufficiently described by those elements (time and number of moves) for which norms are available. Clearly illogical moves, impossible moves, obvious repetitions, exceptionally fast or slow ways of working, frequent failures are characteristic of psychotic attempts at these tests. Patients grading relatively high on the scale frequently give a performance on these puzzles which can be matched only among the low grades of the feeble-minded.

The paper may be very briefly summarized. The results given by a group of psychotic cases on certain psychological tests differed from those given by feeble-minded cases grading at the same "mental age" in the following four ways: —

1. The reaction to certain tests of the scale was strikingly different. Ability to define abstract words was greater; capacity to grasp, retain and reproduce somewhat unfamiliar memory material was less.

2. There was on the tests of the scale a greater consistent total variation from the average normal of the same mental age.

3. There was more individual variation from the average for the group.

4. There was a distinctive reaction to tests of procedure.

These results are based on too inadequate data to be of more

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than the most general significance; a later report is planned to include the large number of psychotic cases being examined with the same tests during the present year. In any event, the tests which appear differential are all too small, and too subject to the chance error of the examination, to allow of any conclusions being drawn from them in particular cases. But as suggesting lines of work which might lead to tests more adequate for such practical purposes, they would seem of definite value. They suggest that the distinction between true primary aments and those cases grading low because of mental disease might be made more definite (*a*) by developing tests (analogous to test 19, definition of abstract words) not requiring new adjustment, but rather drawing upon previous acquisitions of an adult level; (*b*) by setting over against these more satisfactory tests of attention and of learning; (*c*) by using more tests that score procedure as well as end product.

Work along each of these three lines is now being carried on at this hospital.

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HOW MAY WE DISCOVER THE CHILDREN WHO NEED SPECIAL CARE?

By Robert M. Yerkes,

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The question which I have chosen to discuss implies the fact that there exist children who need special care, and the conviction that it is our duty to discover them and to give them the attention which their welfare demands. Science leaves no ground for the denial of human inequality, and experience daily attests the necessity of recognizing it in all human relations. Classes exist even in a democracy, and they are no less real than those of an autocracy; but unlike the latter, they are based upon a multitude of varying bodily and mental characteristics, both innate and acquired, instead of upon the single accident of birth. Our democratic conceptions of human equality and freedom are inspiring, but also in a measure misleading, for on every hand innate tendencies and early environmental influences definitely condition our choices and determine the measure of our success. In education, and indeed in all forms of social endeavor, we face the necessity of adapting our modes of treatment to individual capacities and needs. Our opportunities for increased effectiveness of service through a study of the individual are unlimited; our eagerness is adequate to the social demand; our knowledge of conditions is rapidly increasing; and our methods of observation are improving. Never has the outlook for intelligent and just recognition of individual differences or inequalities been better than at this moment.

As a practical approach to the great task of better suiting educational treatment to the needs of the individual, I wish to suggest the classification of children according to their major characteristics of body and mind; for if we may not at once deal with each child according to his particular traits and tendencies, we may at least be able so to classify him that his needs shall be more satisfactorily met than they are at present.

My plea is for the classificatory study of children as they enter school, since social service, whether medical, educational or re-educational, finds its greatest opportunities early in the

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life of the individual. Indeed, what is done for the child during the first ten years of life is infinitely more important than anything which is likely to be accomplished later. We should strive, alike through the careful study of the individual and through adaptation of educational methods to special needs, for prevention, correction and the increasingly satisfactory guidance of development. In a word, our educational methods should be individualized and specialized in accordance with the varieties of human nature and needs in so far as is economically possible.

The following five classes or groups of individuals are suggested as probably of greatest practical significance in the present state of our psychological and educational knowledge. Careful study of the child in home or school should enable us to place him with assurance in one or other of these groups, and to treat him, thereafter, not merely as a child, but as an individual with certain special and perhaps peculiar needs. The classes are: (1) the intellectually superior or supernormal; (2) the intellectually inferior or subnormal; (3) the intellectually dependent; (4) the affectively or instinctively defective; (5) the mentally normal, typical or average. Each of these classes may now be defined in terms of the essential characteristics, the social significance and the needs of its members.

As intellectually supernormal or superior, we may characterize those children whose present capacity and promise of development point to exceptional mental ability, and who are likely to become leaders in the community. At present, they are often as much handicapped in our schools as are their intellectually inferior companions; for whereas the latter are forced beyond the limits of their mental capacity, the former have inadequate opportunity for the expression of their powers. The social importance of specialized treatment, both intellectual and manual, for this group of children is incalculably great. Upon them human progress chiefly depends. Recently much attention has wisely and profitably been given to the so-called feeble-minded or intellectually weak. We are now beginning to see that, however important this humanitarian work may be, it is even more important that careful attention and special care be given to the intellectually superior.

Intellectual inferiors are the simple-minded members of the community, technically known as morons. While capable of simple forms of manual labor, and, under favorable conditions, of self-supporting existence in a fairly complex environment,

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they are relatively incapable of contributing to social progress, and, from the disinterested standpoint, unfit for parenthood. They are prone to immorality, and tend to perpetuate various types of mental inferiority, and thus innocently to burden, if not also to deteriorate, the race. It is the clear duty of society to provide as adequately as possible for the special training of these individuals in the kinds of work of which they are capable. The indications are strong that our ordinary public school methods and materials are highly inappropriate, for many of these children, even in the primary or grammar school, reach the upper limit of their intellectual development. Thereafter educational effort is wasted upon them, unless it happens to be adapted to their special mental level and to their industrial or vocational possibilities. That the children of this group urgently need special forms of educational treatment, and that these should be intensely practical and dominantly industrial, rather than in the narrow sense intellectual, is fairly obvious.

The intellectually dependent are so designated because of their incapacity for self-supporting activity, whether manual or mental. They are at once eugenically unfit for parenthood and incapable of sharing in social progress. In this group are found idiots and imbeciles. They are seldom grave social menaces, but are rather appropriate objects for human sympathy and pity. All belong in especially adapted homes or institutions for the care of mental defectives, rather than in our public schools or elsewhere in the community. It is alike unfair to them and to the remainder of the school population that they should be treated as normally endowed individuals. Happily, under present conditions, but few intellectual dependents find their way into the schools.

Instinctively, emotionally or morally peculiar or defective children are quite commonly described as queer, uncontrollable or even lacking moral judgment. We have no suitable term for this class of unfortunates. Perhaps "affective deviates" may serve our purpose in lieu of something more satisfactory, for the essential peculiarity of these children is overdeveloped, underdeveloped or unusually related instinctive modes of behavior and feelings or emotions. These peculiarities often appear in connection with excellent intelligence, and they are socially and economically all the more serious because of this fact. Usually affective deviates are classed with the feeble-minded, but it should be noted that their mental defects are strikingly different from those of the

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typical imbecile or moron.* In the group of affective deviates appear juvenile delinquents, the uncontrolled or incorrigible, and from it are recruited criminals, and, in general, those individuals who tend to become social derelicts and menaces. The conspicuous characteristics of the children who belong in this class are instability, irresponsibility and carelessness of the welfare and rights of others. No type of child more urgently demands careful study and special treatment in home, school and community than this. Society can ill afford to overlook this need.

Those individuals whom we call normal, and who are also, as a rule, fairly typical or average, constitute the remainder of the school population, — from 80 to 90 per cent. of the total. Although in these children also individual characteristics are conspicuous and may not safely be ignored, the need for individualized educational treatment is in no sense comparable to that of the four smaller groups already described.

The frequency of occurrence of these five types of children is of importance. At present statistics do not justify dogmatic statements, but the indications are that one or two children in every hundred of the school population are intellectually dependent; that four to six are intellectually inferior; that approximately the same number is intellectually superior; and that one or two are affective deviates. The remaining eighty-four to ninety individuals may be classed as normal.

We come now to the special topic of this address, — how may we select the children who need special care? At present, intensive individual study of every child for the purpose of educational diagnosis is impracticable because of expense. The important question is, can we discover some relatively inexpensive method of working toward the early and efficient discovery of individual needs? I believe that such a method is at hand, and I wish briefly to describe it in connection with a plan for the thorough survey of the population of a school system.

A staff of well-trained and experienced experts, including a physician, a psychologist, an educator and a social worker,

* The general impression that all mental defects are intellectual impels me to call attention to the following facts: Feeble-mindedness, or, better, mental defectiveness, is of several sorts. The most important varieties are the intellectual and the affective. Intellectual defectives are more or less stupid, dull, simple-minded. They may, however, possess relatively normal instincts, excellent self-control, and ability to get on fairly well in a relatively simple social environment. On the contrary, affective deviates, or the affectively feeble-minded, are peculiar in their instinctive equipment, quite irrespective of their intellectual capacity. The essential differences of these two types of mental unfortunates clearly appear from the study of groups of juvenile delinquents, some of whom exhibit both intellectual and affective defects, others only the affective.

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should be organized. These experts should study the entire school population of some city, county or State by means of the best methods of physical and mental measurement available. The following is proposed as an economically and scientifically possible procedure in an extensive survey whose end is the discovery and classification of such individuals as need special educational treatment.

As initial procedure, the experts should make physical, medical and psychological examination of the children by groups of 20 to 50. The purpose of the group examination should be the discovery of physical and mental peculiarities, defects or degrees of development which are actual or possible handicaps in school or vocational work, and which suggest the desirability of more thorough study of the individual as a basis for educational or medical treatment. This examination should be inspectional in its physical and medical portions, but it should be conducted systematically and according to a definitely prearranged plan. The psychological examination, on the contrary, should consist of a series of mental measurements to be made simultaneously on all children in the group in from thirty to sixty minutes.

By means of the group examination, which would have the advantage of demanding but a fraction of the time necessary for individual examinations, the examiner should be enabled to select those few individuals (perhaps 10 or 15 per cent.) who belong in the four especially significant categories enumerated above. All other children having been passed as relatively normal or typical, the experts would naturally turn to the more special and detailed study of the exceptional pupil.

The next step in the survey would be the reasonably thoroughgoing, physical, medical and psychological examining of each pupil selected by the group examination as in any way exceptional. These intensive individual examinations might be expected to yield data for definite decision as to the classification of the individuals.

Finally, the examiners should make a detailed report concerning the physical and mental findings for each individual especially examined, together with suggestions or definite recommendations concerning proper, desirable or urgent educational, medical or vocational treatment.

The special methods of examination may not be described in detail, but it is necessary to indicate certain salient features of the proposed modes of mental measurement.

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The varied measurements necessary for physical and mental description or diagnosis are widely known and appreciated, if not perfectly understood. Mental measurements, on the contrary, are little known and pretty generally misunderstood, for the mental is thought of as intangible, immeasurable, even as mysterious, and most persons find it either impossible or extremely difficult to imagine how any one's mind can be so examined that it may be described with reasonable definiteness and precision. In view of this condition of affairs it is pertinent to state that the psychological examiner measures certain forms or aspects of behavior, — what the individual does, not what he feels or thinks. It is the function of the trained examiner, by contrast with the casual observer, (*a*) to arrange certain definitely describable conditions of reaction so that the same situation may be presented to each person who is examined; (*b*) to ascertain, by the extensive application of a given method, what may be expected of the normal or average person; (*c*) to measure in some definite way the response of a given individual to the particular situation which is presented; and (*d*) to evaluate this response in terms of a standard of judgment or norm.

One or two illustrations may render this account of the examiner's task more intelligible. As a test of reasoning power, seven capital letters, printed on a card, are placed before the subject, with the request that he arrange them in order of increasing total length of line used in the letters. From previous application of the test the examiner knows the average time necessary for reaction, and the degree of success (amount of credit). He therefore is able to compare the performance of any individual with a standard of expectation or norm, and to state that the subject in question falls below or exceeds expectation by a definite amount. Or again, as a test of memory, the examiner reads to the subject a certain passage, and thereupon asks him to reproduce what has been read. A careful record is made of the subject's recall, and credit is given according to the number of ideas which he correctly reproduces. This, in turn, is compared with a previously established standard or norm, and the subject's performance evaluated.

Thus the psychological examiner, by presenting most diverse types of situation to his subject, is able to obtain fairly representative and reliable records of behavior, and in the end to offer a serviceable description of the person's mental constitution and capacities, or, better, of his reactive tendencies and capacities.

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Among the conspicuously important mental processes or aspects of behavior which are commonly measured, and which assuredly would have to be considered in any thoroughgoing study of a school child, are ability to sense by ear, by eye, by touch; to perceive or observe the qualities and relations of objects; to learn to respond adaptively to typical situations (habit formation); to recall; to imagine; appropriately to resist suggestions; to arrive at practically serviceable judgments; to command information and favorable modes of expression; to co-ordinate various forms of response in the attempt to express ideas; to reason and act out the conclusions achieved.

Behavior is multiform, and there are many interesting and important aspects which may be measured, but for educational purposes only those of chief practical importance may be considered. A school survey would necessarily involve the careful selection of mental tests. One representative group of tests would constitute the preliminary or class examination; another group would similarly constitute the intensive individual examination. Of the value of these tests the most satisfactory criterion is successful living, and the wise selection of methods of measuring mind becomes increasingly possible as data from the psychological study of human failures accumulate. Careful psychological examinations of delinquent, criminalistic, immoral, shiftless, unstable individuals, as they appear in our varied public and private institutions, are being made; and contrasted with the results are such as are obtained from like studies of those who have made life a success.

Hundreds of serviceable methods of measuring aspects of human behavior are available. There are ways, even good ways, of studying the human mind and its expressions, but there is a lamentable scarcity of adequately trained, experienced, intelligent and wholly competent users of these methods. There is no more difficult task than the scientific study of man as a conscious and active being. Psychological examining, therefore, demands exceptional insight, intelligence and skill, in addition to the mastery of the essential principles of scientific method and technical training.

No *thorough* study of a relatively large and representative group of school children has even been made. Studies of educational methods and machinery abound. Their importance is undeniable, but how much more important is accurate knowledge of the characteristics of the human materials for which our

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educational system exists! The physician who ventures to prescribe by rule of thumb, ignorant or careless of the symptoms of his patient, forfeits the respect of his profession. Are we not, as teachers, prescribing educational treatment prior to intelligent diagnosis, and even in utter ignorance of the chief physical and mental characteristics of our pupils? I must plead guilty. That this state of affairs is unworthy of our intelligence, of our boasted educational progressiveness and of our sense of justice cannot be questioned.

We urgently need the thorough study of the population of a school system as an object-lesson. Only thus can the road be cleared for rapid progress toward intelligent individualization of educational procedure. The movement for mental hygiene which has already done much to improve the condition of the mentally afflicted is bringing new light, not only into our hospitals, asylums and schools for defectives, but even into our public schools.

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THE WEIGHTING OF POINT SCALE TESTS.*

By Rose S. Hardwick,

PSYCHOLOGIST, NEW ENGLAND HOME FOR LITTLE WANDERERS.

The Yerkes-Bridges point scale as now used is a weighted scale, that is, the various tests are assigned different values in the scoring; for example, test 14, constructing a sentence with three given words, counts only 4 points, while test 15, comprehending questions, counts 8 points towards the maximum of 100 points. Since the examination has for its object the measurement of mental ability, the tests would be correctly weighted if their scores were proportioned to their respective correlations with general intelligence. Now the only way we have of representing a subject's intelligence numerically is by the result of the mental examination. Hence, the problem of determining the correct weighting of the tests must be solved by a series of approximations.

It would have been simpler to construct a scale with unweighted tests, using either the all-or-none principle of scoring, or partial credits on a fixed scale. Neither of these devices is satisfactory, however.

The all-or-none method is wasteful. To take one of the most obvious illustrations, it requires the same amount of time to give the test of words in three minutes, whether the subject responds with many words or few, and it is plain that 25 or 105 words, for example, is quite as significant as 60 (the number credited in the usual Binet test). We are throwing away both time and valuable evidence when, in scoring, we fail to recognize more than one result of such a test.

Again, if we give partial credits on a fixed scale (in this case five points for each test) we assume that all the tests are correlated alike with general intelligence, and the evidence does not bear out this assumption.

The scoring now in use for the point scale represents a first approximation to the correct weighting. A second approxima-

* This problem was suggested by Dr. R. M. Yerkes, psychologist, Psychopathic Hospital, as a first approach to the correct weighting of tests for the point scale. Being Contributions of the Massachusetts Commission on Mental Diseases, whole number 184 (1917.4). The previous contribution was No. 183 (1917.3), by Dr. R. M. Yerkes, entitled "How may We discover the Children Who need Special Care?" (to appear in Mental Hygiene, Vol. 1, No. 2, p. 252). Reprint from September, 1917, Journal of Educational Psychology.

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tion would naturally be based on a study of the correlations between the scores made on the several tests as now given and the total scores resulting.

These correlations have been computed for three different age groups of the school children whose records were used in calculating the published norms.[1] They are all children of English-speaking parents, and were living in a medium to poor city neighborhood.

Group I consists of those members of the twelve-year-old and the thirteen-year-old age groups, whose records show no zero scores in all 53 subjects. It is roughly the equivalent of a somewhat higher age group, but an unselected group at this age might be expected to show higher correlations.

Group II consists of the entire nine-year-old age group, 43 subjects.

Group III consists of the entire six-year-old age group, 53 subjects.

Table 1 shows the values of r obtained for these three groups, together with their averages, the tests being arranged in the order of their correlation as represented by these averages. None of the coefficients is negative, but there are several zeros, and some other values are so low that their signficance is open to question. The highest correlations appear under Group II. Thus for all three groups there are thirteen values above .60, and nine of these are under Group II, while only two of the eighteen values below .30 belong to that group.

It is noticeable that some of the tests that rank highest in order of correlation for the two older groups also rank well (though not highest) for the youngest group; and some of these, such as tests 4, 6, 9 and 15, could readily be modified by the addition of easier parts so as to be still better suited to the younger subjects.

On the other hand, tests 1 and 11 rank very low in all three groups. Test 11 was looked upon with suspicion at the time when the point scale was being developed; so much so that in the earlier form of the record sheet a test (16*a*) appears as a possible substitute. The line suggestion test was finally retained as being "a fair indication of varying suggestibility" so far as could be judged from the data then available. Judging from these correlations, however, this type of suggestibility is not highly correlated with general intelligence, and the early suspicions of the test are justified.

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TABLE 1. — *Tests in Order of Correlation.*

Order.	No. of Test.	Name of Test.	Values of r for Age Groups.				Weighting.		
			I. (12 and 13).	II. (9).	III. (6).	Average.	Actual.	Suggested.	Theoretical.
1	9	Comparing remembered objects.	.53	.73	.49	.58	6	9	9
2	15	Comprehending questions.	.64	.68	.40	.57	8	8	9
3	20	Analogies, . . .	.58	.71	.42	.57	6	8	9
4	4	Memory for digits, .	.54	.62	.49	.55	5	7	8
5	13	Words in three minutes,	.50	.65	.45	.53	4	7	8
6	17	Detecting absurdities, .	.53	.61	.33	.49	5	5	7
7	6	Repetition of sentences,	.43	.59	.38	.47	6	6	7
8	10	Defining concrete terms.	.44	.56	.34	.45	8	6	6
9	19	Defining abstract terms,	.63	.62	0	.42	6	6	6
10	18	Dissected sentences, .	.52	.63	0	.38	6	5	5
11	12	Copying square and diamond.	.21	.39	.52	.37	4	4	5
12	5	Counting backward, .	0	.50	.61	.37	4	4	5
13	8	Arranging weights, .	.19	.37	.51	.36	2	4	4
14	16	Designs from memory,	.26	.44	.36	.35	4	4	4
15	7	Reaction to three Binet pictures.	.17	.30	.54	.34	9	6	4
16	2	Detecting missing parts,	.11	.28	.61	.33	4	4	4
17	14	Sentence with three given words.	.26	.61	.12	.33	4	3	4
18	3	Comparison of lines and weights.	0	.57	.29	.29	3	2	3
19	11	Resisting suggestion, .	.16	20	29	22	3	1	1
20	1	Choosing of prettier, .	0	.35	.24	.20	3	1	1

The column "actual weighting" gives the scores now in use. The "theoretical weighting" was obtained as follows: It was assumed that the highest score would be 9, as heretofore, and that in view of the very low correlations of some of the tests, the minimum score should be 1. By means of a graph the tests were then weighted, to the nearest unit, in proportion to the corresponding values of r (Fig. 1).

This gave to tests 2, 3, 14, 16 and 19 the same scores as at present. For some others, such as test 9, comparing remembered objects, the change to the theoretical value is easily made. Subjects often volunteer more than two items of difference in making these comparisons, and if we credit 1 point for 1 item of difference, 2 points for 2 items, and 3 points for 3 or more items, we obtain 9 as the maximum, which is the theoretical weighting. Certain other tests, however, such as test 15, com-

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prehending questions, do not lend themselves so readily to this readjustment, and the column headed "suggested weighting" represents a compromise between theory and practice. In no

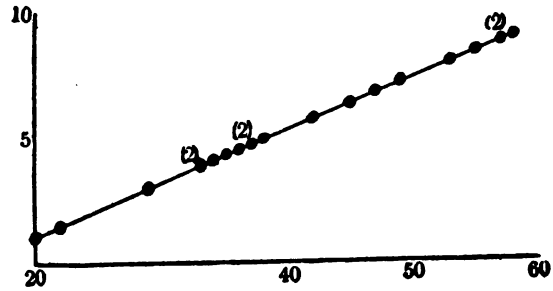

FIG. 1. — Graph for determining theoretical weighting. Ordinates = scores; abscissæ = average coefficients of correlation.

case has a score been changed by more than 3 points, and the modifications have been such as to give a total of 100 points, as at present, instead of the inconvenient 109, which is the sum of the "theoretical" values. Other considerations were taken

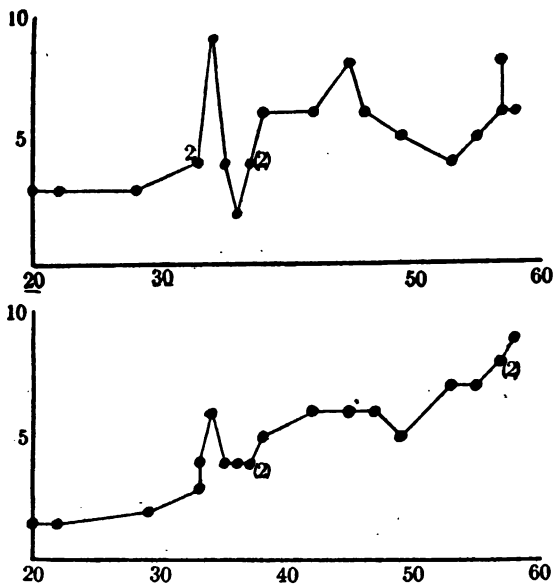

FIG. 2. — Graphs showing relation of actual and suggested weighting to the average coefficients of correlation. Ordinates = scores, for the upper curve the actual and for the lower curve the suggested weighting; abscissæ = average coefficients of correlation.

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into account in rating the individual tests. Thus test 7, reaction to three Binet pictures, should theoretically be reduced from 9 points to 4, but its correlation coefficient is .54 at six years, and, since this age group is more meagerly represented than the others in the examination program as a whole, this score was held at 6 points. On the other hand, test 3, comparison of lines and weights, was reduced 1 point below the theoretical weighting because its only high correlation appears in Group II, which has the advantage over both of the other groups in the program as a whole.

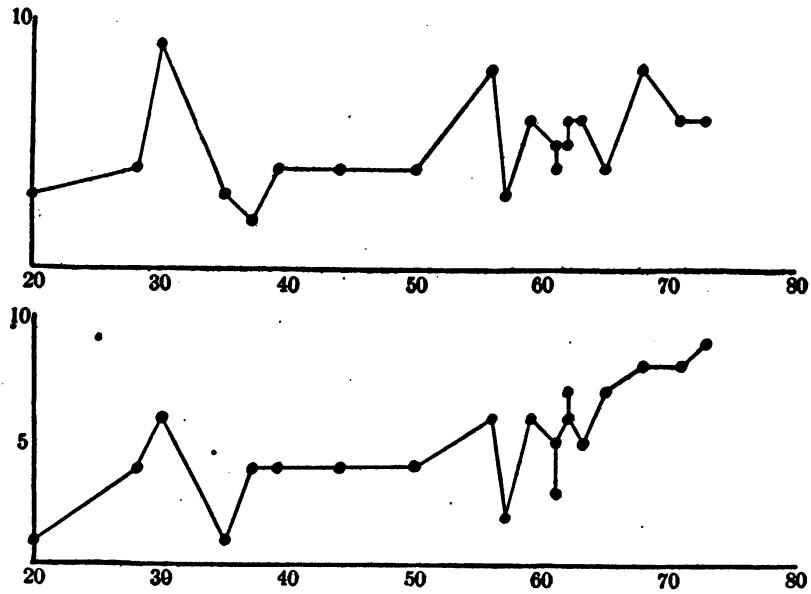

FIG. 3. — Graphs showing relation of actual and suggested weighting to coefficients of correlation for Group II. Ordinates = scores, for the upper curve the actual and for the lower curve the suggested weighting; abscissæ = coefficients of correlation for Group II.

The graphs of Figs. 2 and 3 indicate the relation of the "actual" and the "suggested" weighting to the order of correlation as represented, respectively, by the averages for all three groups and by the coefficients for Group II. The curve should approximate that of Fig. 1. The improvement is most evident in dealing with the averages, as was to be expected, but it is recognizable also for the nine-year-old group. In Fig. 2 the lower curve presents two marked irregularities, namely, a high point for the sixth test in ascending order of correlation, and a low point for the fifteenth. The former test is the reaction to

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three Binet pictures, and the reason for giving to that 6 points instead of 4 has been explained already. The latter is the detection of absurdities, and this was held at 5 points because of the practical difficulty of deciding how to give the two additional points which theory demanded.

The "suggested" weighting leaves the scores unchanged for eight tests, namely: —

Test 2, detecting missing parts.
Test 5, counting backwards.
Test 6, repetition of sentences.
Test 12, copying square and diamond.
Test 15, comprehending questions.
Test 16, designs from memory.
Test 17, detecting absurdities.
Test 19, defining abstract terms.

For the remaining twelve tests the suggested weighting might be obtained in various ways. In order to try out the new values with the records of some examinations already made, the rules for scoring were modified as follows: —

Comparing Remembered Objects.

3 points credit for 3 or more correct items of difference

Analogies.

e and f, each, 2 points credit.

Memory for Digits.

d and e, each, 2 points for success in first trial, 1 point for success in second trial.

Words in Three Minutes.

15 to 29, inclusive, 1 point; 30 to 44, inclusive, 2 points.
45 to 59, inclusive, 3 points; 60 to 74, inclusive, 4 points.
75 to 89, inclusive, 5 points; 90 to 104, inclusive, 6 points.
105 and upward, 7 points.

Defining of Concrete Terms.

b disregarded.

Dissected Sentences.

c, 1 point credit.

Arranging Weights.

4 points for correct arrangement in first trial.
3 points for correct arrangement in second trial.
2 points if in either trial the arrangement is correct except for the transposition of two consecutive weights.

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Reaction to Binet Pictures.

No credit for interpretation.

Sentence with Three Given Words.

3 points credit if the three words are used in one sentence.
2 points credit if they are used in two sentences very loosely connected.
1 point credit if they are used in two separate sentences.

Comparison of Lines and Weights.

b and c together, 1 point credit; that is, no credit on these two if there is a failure in any one of the four trials.

Resisting Suggestion.

1 point credit if the suggestion is not accepted more than once.

Choosing of Prettier.

1 point if not more than one of the three pairs of faces is incorrectly judged.

TABLE 2. — *Illustrative Records (in Order of Increasing Scores).*

[Mental ages marked N-E were computed from the non-English speaking norms.]

ORDER.	No.	Sex.	AGE.		SCORES.		Change in Score.
			Chronological.	Mental.	Actual.	Suggested.	
1, ...	12	M.	6.2	Less than 4	16	15	—1
2, ...	6	M.	8.5	5.5 N-E	24	22	—2
3, ...	9	F.	4.8	5.4	25	22	—3
4, ...	1	M.	6.7	7.0	35	30	—5
5, ...	2	F.	7.7	8.7 N-E	45	42	—3
6, ...	11	F.	8.7	9.2	57	53	—4
7, ...	13	F.	14.5	9.2	57	53	—4
8, ...	14	F.	19.8	10.7	64	60	—4
9, ...	8	M.	14.0	11.2	67	63	—4
10, ...	10	M.	13.7*	11.6	72	69	—3
11, ...	4	F.	19.2	14.0	81	78	—3
12, ...	3	M.	14.5	17.5	87	81	—6
13, ...	5	M.	14.4	18.0	88	83	—5

Table 2 shows the effect of this revision in 13 cases,* arranged here in order of increasing scores. It is evident that the "sug-

* These subjects are children in the care of the New England Home for Little Wanderers, and were examined there as a matter of routine.

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gested" weighting, thus applied, tends to lower the total score by from 1 to 6 points, and that the lowest scores are the least affected. The lowering of the totals might have been anticipated from the fact that in these three groups high correlations are generally found with average scores of medium value, and low correlations most frequently with high average scores (Table 3). This is especially marked in the two older groups. It is what might be foreseen from theoretical considerations. The more highly a given test correlates with general intelligence, the more closely will the curve of distribution for the scores of that test approximate the normal, bell-shaped form, the average score at the same time approaching 50 per cent. of the maximum for that test. On the other hand, if the average score for a certain test is very high or very low we may expect it to show a low correlation with general intelligence. It is to be noted that the situation in this regard is totally different from that which obtains for the Binet age scale in its various forms.

That the lower scores of Table 2 are least affected by the revision is accounted for when it is seen (Table 3) that for Group III some of the lower correlations are found in conjunction with very low scores, the two zero correlations corresponding to zero scores.

In making up this group for purposes of illustration the intention was to include as great a variety as possible, in the hope that some of the changes in score might be of interest in connection with the types of case involved.

Subject No. 1 shows an unexpectedly heavy loss. He did surprisingly well in the examination and in some "performance" tests which were given him, but in the early part of the interview his expression and manner gave a strong impression of feeble-mindedness, and some of his social reactions, as reported, are suggestive of mental deficiency.

In the other cases the effect of the change in scoring seems to be correlated with the total score and not at all with the type of case. Thus No. 11 is a normal child of a good type mentality, while No. 13 is a high-grade defective and calls for institutional care. Yet their scores are identical for both ways of reckoning.

As the rules followed in these illustrative cases might seem arbitrary, the score was made up by proportion for one subject, No. 5 in Table 2. Using the suggested weighting, his score becomes 86.6, and using the theoretical weighting and reducing to the scale of 100, it is 84.3. This indicates (1) that correct

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TABLE 3. — *Percentage Values of Average Scores (in Order of Correlation of Tests).*

ORDER.	GROUP I.			GROUP II.			GROUP III.		
	No. of Test.	*r.*	Average Score.	No. of Test.	*r.*	Average Score.	No. of Test.	*r.*	Average Score.
1, . . .	15	.64	81	9	.73	80	2	.61	68
2, . . .	19	.63	68	20	.71	20	5	.61	25
3, . . .	20	.58	57	15	.68	41	7	.54	59
4, . . .	4	.54	86	13	.65	48	12	.52	40
5, . . .	9	.53	98	18	.63	25	8	.51	20
6, . . .	17	.53	76	4	.62	72	4	.49	56
7, . . .	18	.52	65	19	.62	15	9	.49	25
8, . . .	13	.50	85	14	.61	50	13	.45	15
9, . . .	10	.44	81	17	.61	28	20	.42	2
10, . . .	6	.43	77	6	.59	65	15	.40	14
11, . . .	14	.26	93	3	.57	83	6	.38	65
12, . . .	16	.26	73	10	.56	60	16	.36	10
13, . . .	12	.21	93	5	.50	95	9	.34	41
14, . . .	8	.19	95	16	.44	30	17	.33	2
15, . . .	7	.17	84	12	.39	75	3	.29	57
16, . . .	11	.16	93	8	.37	70	11	.29	37
17, . . .	2	.11	100	1	.35	100	1	.24	77
18, . . .	3	0	100	7	.30	71	14	.12	1
19, . . .	1	0	100	2	.28	93	19	0	0
20, . . .	5	0	100	11	.20	50	18	0	0

weighting would tend to lower the total scores, (2) that the suggested weighting does not tend to lower them unduly, and (3) that the rules followed in working out the illustrative cases are only approximately satisfactory.

In scoring test 7, it is a question whether it was justifiable to disregard interpretation. It might be fairer to disregard entirely one of the three pictures. It is doubtful, however, whether in the present form of the test failure to interpret should be allowed to count against a subject. Some of the ablest individuals do not understand the question in this sense. As the test is modified in the adult scale this objection is removed, and the score may be expected to show a much higher correlation with general intelligence.

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Comparison of the values of r with the actual scores indicates that higher correlations tend to appear for those tests which offer the greatest number of possible gradations in the scoring. Hence, if test 13 is scored as in the illustrative cases it may be expected to show a higher correlation than at present. It is likely, moreover, that the improvement would be greatest for Groups I and III, where this test is now weakest. The separation of concrete terms and abstract terms, so as to make two tests in defining, seems artificial; and if these tests (10 and 19) were treated as one, a higher correlation might be expected to appear. A like statement might be made in regard to test 3, b and c, comparison of weights, and test 8, arranging weights.

REFERENCE.

1. YERKES, BRIDGES AND HARDWICK: "A Point Scale for measuring Mental Ability," p. 66.

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HOW SHALL LATENT SYPHILIS BE TREATED? THE PROPHYLAXIS OF SYPHILIS OF THE CENTRAL NERVOUS SYSTEM.*

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Latent syphilis means that the individual affected shows no active or patent manifestations of syphilis, but that the virus has not been eradicated from the body and hence may later become actively patent. This latency is characteristic of syphilis and has long been recognized. Formerly one of the most fertile fields of argument, one of the points calling for the greatest clinical judgment, was the differentiation of latency from cure. Now, by the aid of the Wassermann reaction, it is somewhat easier to settle this point. While it is not by any means true that a negative Wassermann test on the blood serum means a cure, it will be well for the present discussion to consider that at least in the majority of cases reliance can be placed upon consistently negative Wassermann reactions on the blood serum and a negative spinal fluid examination; and a patient giving these negative reactions can be regarded as free from syphilis. Our definition of latent syphilis in an individual will be this: a condition in which there are no discernible lesions or manifest symptoms except the positive Wassermann reaction. In latent syphilis we believe that the spirochete exists in the organism, but is not causing any discernible symptoms.

Various explanations are put forward to account for this phenomenon. By some it is held that the spirochete, whether protozoan or bacterial, has phases in its life cycle in which it causes no symptoms. By others it is believed that the body has gained the upper hand and eradicated all but a few spirochetes hidden in some secluded part of the body, where they live in symbiosis with their host, only to come forth at a favorable moment. However, it is not especially pertinent for us to consider these theories at this time. Let us rather consider the course of syphilis.

The primary stage, characterized by a chancre and some lym-

* Reprinted from the Interstate Medical Journal, Vol. XXIII, No. 8.

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phatic manifestations, rarely causes more than local discomfort, possibly some malaise. There are some few exceptions to this, as the phagedenic chancres. However, as a rule, this stage is not dangerous to the life of the patient, and it was formerly taught that treatment should not begin at this time. The secondary period, again, in the majority of cases frightens the patient more than the physician, for with the exception of a small minority of cases giving rise to precocious nervous system accidents, the recognized symptoms are mostly cutaneous, and the patient's life or effectiveness is not seriously endangered. It must be emphasized, however, that as Wile and Stokes and others have shown, the central nervous system, or at least the meninges, are involved in a large percentage at this stage. Still, serious accidents are very rare and the patients usually recover from the secondary symptoms with or without treatment. Because the patient so often showed no serious results without treatment it was held by some syphilographers that treatment was not indicated. This is not intended as a historical survey of the treatment of syphilis, but will serve to emphasize the fact that, as a general rule, the early stages of syphilis do not disintegrate the organism. These stages are relatively benign. It is the later stages, the tertiary and so-called "parasyphilitic" conditions, that are such a great menace to the patient. But as a rule there is a time between the secondary symptoms and the latter symptoms when the patient shows nothing subjectively or objectively, except the positive Wassermann reaction and possibly pathological findings in the spinal fluid. This is the latent period. But this latent period is far from an assurance of safety. Syphilis is a disease characterized by remissions and exacerbations of symptoms. And it is for this reason it is recognized that syphilis should be treated after symptoms have cleared up.

Fournier strove for many years to convince the medical profession that a syphilitic patient should be treated for at least two years after his infection, whether the syphilis seemed latent or patent. The method of treating only the symptoms he characterized as the opportunist method; treatment in the absence of definite symptoms the preventive method, as preventing the later manifestations. That prolonged treatment does prevent is shown by Fournier's figures analyzing 2,396 cases presenting tertiary signs. These he divides into three groups, — Group 1, comprising 1,878 cases, or 78 per cent. of the whole number, having no treatment or inadequate treatment, that is, mercury for less

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than one year; Group 2, comprising 455 cases, or 19 per cent., having moderate treatment, that is, mercury for one to three years; and Group 3, comprising the remaining 19 cases, which represent only 3 per cent. of the whole number, having treatment for more than three years.

To-day we well recognize this necessity of adequate treatment, not judged alone by time of treatment, but by the symptomatic results controlled by the Wassermann reaction. All syphilographers advocate strenuous treatment after the infection until this is accomplished.

If, however, the patient does not follow the advice, discontinues treatment and shows no symptoms for a long period, the matter seems somewhat difficult. Let me ask what you would advise a patient whom you learned had a syphilitic infection five to ten years ago, who has had no symptoms following the secondary stage and who now has no symptoms except a positive Wassermann reaction in his blood serum? I have put this question to several syphilographers, but as a rule have not received a direct reply. It may be stated that the attitude in general is to leave well enough alone. It is frequently stated that we are to treat the patient, not a laboratory reaction; why, then, disturb a patient when there are no symptoms? We, on the contrary, must agree with Craig in considering the positive Wassermann reaction a definite symptom of syphilis.

The thesis I wish to maintain is that these patients suffering from such latent syphilis deserve and are entitled to as thorough antisyphilitic therapy as though there were patent symptoms.

It has been stated above that the primary and secondary symptoms are relatively less important than the later conditions. These later conditions include general paresis, cerebrospinal syphilis, tabes dorsalis, angina pectoris, arteritis, aneurysm, cirrhosis of the liver, etc. These conditions seriously menace life, and are only slightly amenable to treatment. The history, in all but very rare exceptions, is this: an infection with more or less prominent symptoms in the primary and secondary stages, and then a period of *latency* lasting from months to thirty or more years, followed by patent symptoms of the severe disease conditions. There are a few exceptions where the usually late severe manifestations occur during the secondary period, but these "precocious" cases are rare.

As previously stated, syphilis may be considered a disease of remissions and exacerbations, the latent period merely a remis-

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sion, following which a severe lesion is to be expected. Therefore when we treat a patient having a positive Wassermann reaction during the period of latency, we are not treating the reaction, but rather the patient, for the purpose of curing him of a chronic disease and thus preventing a flare-up. We are treating the patient and not merely a symptom. To use Fournier's terminology, this is preventive treatment, not opportunist or expectant treatment.

Let us consider syphilis of the central nervous system, or neurosyphilis. In this group occur a number of clinical entities such as general paresis, cerebral and cerebrospinal syphilis, tabes dorsalis, gummata of brain, etc. These are nearly always late manifestations. As has been pointed out by White and others, secondary, skin and visceral lesions are seldom precursors of these nervous system diseases. Hence there is a long period of latency during which the patient shows nothing but the positive Wassermann reaction.

It is to the point to ask, What percentage of patients infected with syphilis show central nervous system involvement, and what can be done about it? Probably the best figures on the incidence of neurosyphilis are those of Mautauschek and Pilcz. They traced 4,134 officers of the German army who had been infected with syphilis between 1880 and 1890, and found that by 1912 about 10 per cent. showed neurosyphilis. Figures of Fischer are similar. In actual figures general paresis alone, according to Salmon, was responsible for the death of 1 in 9 of the 6,909 deaths in men between thirty-five and fifty years of age in New York for one year.

The second question is, What will treatment during the latent period accomplish? Unfortunately no definite figures can be given on this matter, because this investigation has never been actually carried out, but there is considerable evidence from which conclusions may be deduced to show that this treatment is of avail. Thus, if we look at the figures of Fournier quoted above, it will be seen that with adequate treatment the late manifestations are very infrequent. And now with newer methods, that is, salvarsan and the Wassermann reaction, it is reasonable to suppose that even better results will be obtained. It is true that the earlier the disease is treated the easier the cure. However, the intermittent method of treatment used by Fournier is comparable to treating the later latent stage after a longer intermission from treatment. But even more to the point is the

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fact that even after the active manifestations of cerebrospinal syphilis have occurred, adequate treatment will generally cure; therefore it is logical to suppose that applied earlier it would have acted as a preventive.

In every case showing a positive Wassermann reaction, a lumbar puncture is indicated for the purpose of examining the spinal fluid. If this is positive, active treatment is very urgent. But negative findings in the spinal fluid are no evidence that cerebral involvement has not already occurred, for as Head and Fearnsides have said, it is probable that when the process is entirely cerebral, the fluid remains negative, and in cerebral endarteritis the same is true. Still less is the negative fluid evidence that no later involvement may occur. At what stage in the disease the fluid first shows signs of active inflammatory process is entirely unknown. According to the theory advocated by Fildes and McIntosh, a sensitization of the tissue occurs early in the disease, and later the activity of a few organisms causes an intense reaction — a hyperalgia. If this theory be true, change from negative to positive spinal fluid will occur rapidly, and a negative examination at one time is no guarantee of the condition to be found shortly thereafter.

So for the prevention of neurosyphilis alone, every syphilitically infected individual giving a positive Wassermann reaction deserves and is entitled to strenuous antisyphilitic treatment in order to prevent the later serious results of syphilis. Deductive and inductive reasoning allow us to maintain that treatment given during the latent period will really accomplish this prophylaxis against syphilis of the nervous system and general visceral syphilis.

In advocating the treatment of latent syphilis, the difficulties of carrying it out are not forgotten. There is the necessity of warning the patient of the possibilities of future disaster, with all that this entails, — the great expense and inconvenience to the patient, and the absence of spectacular results which is inherent in prophylactic work. But the amount of good, the insurance against late manifestations, I believe, far outweigh the difficulties.

The two following cases well illustrate the dangers of expectant treatment and how ill-grounded is a feeling of security during the absence of manifest symptoms.

Case I. — H. S., age, twenty-nine. Patient was infected several years ago. He did not follow the prescribed treatment, as he felt well.

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He married two years ago. His wife has had no symptoms suggestive of syphilis. There were no abortions, miscarriages or stillbirths. There is one child. The Wassermann reactions on both mother and child are negative. In spite of the absence of symptoms, the patient worried about his infection and his failure to follow advice, so he sought examination at a syphilitic clinic. The Wassermann reaction was positive and arrangements were made for him to receive treatment. He paid for a salvarsan treatment, but because of the shortage of the drug on account of the war, it was decided not to give him the treatment, but keep the drug for "a more urgent case," meaning the earlier, more active stage. It was not considered worth while to give him other antisyphilitic treatment. Ten days after the treatment was refused patient developed a cerebral thrombosis. He was brought to the hospital in a stuporous condition with a left hemiplegia. For a number of days he was not expected to live. The Wassermann reaction of blood serum and spinal fluid was positive. Under active salvarsan, mercury and iodide treatment his mind became clear, the Wassermann reaction became negative, and the other spinal fluid findings became normal, but he was left with a hemiplegia sinistra. The production of the negative Wassermann reactions, and the clearing up of the pathologic signs in the spinal fluid, indicate that earlier treatment would have prevented this accident.

Case II. — J. P., age, forty-eight. Patient was infected with syphilis twenty-six years ago. He received pills for about three to four months. No other treatment. He was apparently well and married seventeen years ago. There was one child born sixteen years ago; no other pregnancies. The child born ten years after the primary infection, that is, during the "latent" period, has since died of juvenile paresis. The patient, however, continued in good health until six months ago, when he began to suffer from lancinating pains. On examination it was found that he had tabes with the classic signs and positive blood and spinal fluid, and symptoms of but six months' duration. Here, again, we cannot help but feel that had his "latent" syphilis been treated sufficiently during the nine years preceding marriage there would not have been a juvenile paretic; or had his "latent" syphilis been treated but a few years ago he might not have developed tabes.

By treating latent syphilitics we believe that much can be done in preventing the later and more serious forms of syphilis. This offers a most important means of preventing tabes and general paresis. We believe, therefore, that the answer to the question, How shall we treat "latent" syphilitics? must be, — treat the patient until a cure is obtained.

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Summary.

1. In the course of syphilis the latent period represents merely a shorter or longer remission.

2. A positive Wassermann reaction, indicative of latent syphilis, is an indication for careful examination, lumbar puncture and antisyphilitic treatment.

3. The primary and secondary symptoms of syphilis, in comparison with the later manifestations, are relatively benign.

4. Adequate treatment during the period of latency is insurance against dangerous or incurable conditions of the later stage. It is essential for the prevention of physical and mental disease.

5. Treatment should be continued until the patient can be declared cured.

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TACTUAL DISCRIMINATION AND SUSCEPTIBILITY TO THE MÜLLER-LYER ILLUSION, TESTED BY THE METHOD OF SINGLE STIMULATION.*

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In a critical article on ethnological tests of sensation and perception, Titchener has suggested† that under field conditions "all or none" tests, applied in single trials to numerous individuals, may prove more practical, and may yield results more satisfactory, at least for anthropological purposes, than tests involving repeated application or fractional grading. In many respects the difficulties and the sources of error in experimentation upon savages are the same as those encountered in working with abnormal subjects. It seemed to us, therefore, that by imitating the simplicity of task, apparatus, and method necessary under field conditions, and by running parallel series of tests on normals and abnormals, we might at least get some indication of the practicability of the proposed method.

Subjects.

Our investigation was carried out between January and April, 1917. The total number of subjects used for the experiment on tactual discrimination was 444; for that on susceptibility to the Müller-Lyer illusion, 627.‡ We have grouped our subjects as follows: —

1. Superior normal subjects, 157: successful business men, 21; wives of successful men, 40; professional women, 27; professional men, 21; business women, 16; students in college or graduate school — men, 11, women, 16; well-educated women with no occupation, 5.

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* Being Contribution of the Massachusetts Commission on Mental Diseases, whole number 186 (1917.6).

† E. B. Titchener: "On Ethnological Tests of Sensation and Perception, with Special Reference to Tests of Color Vision and Tactile Discrimination in the Reports of the Cambridge Anthropological Expedition to Torres Straits." Proceedings of the American Philosophical Society, Vol. LV, 1916, pp. 204-236.

‡ It will be seen that the total number of cases does not always tally with the number given in a table. The reason for this is that not all subjects were given both tests. For example, four subjects (three dementia præcox and one feeble-minded) refused to be touched with the æsthesiometer, and one blind subject (dementia præcox) could not be shown the illusion. We have thought it simpler to drop such cases from the tables than to introduce a column showing the number of subjects to whom a particular test was not given.

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II. Average normal subjects, 74: nurses, 16; stenographers, 16; male hospital employees, 9; housemaids, 6; dressmakers, 3; clerical workers, 3; clerks, 2; telephone operators, 2; laborers, 2; no occupation, 2; school boy, delivery man, elevator boy, steamfitter, milkman, grocer, lumberman, painter, teacher of small school, sewing teacher, special teacher, housewife, matron, each 1.*

III. Feeble-minded subjects, 162: girls at the Massachusetts School for the Feeble-minded at Waverley, 107; patients at the Psychopathic Hospital, 45; patients at the Danvers State Hospital, 10. The patients at the Danvers State Hospital and one of those at the Psychopathic Hospital were not given psychological examinations to determine their mental age. The remainder range in mental age from 5.2 to 18+.

IV. Subjects suffering from dementia præcox either at the Danvers State Hospital or at the Psychopathic Hospital, 61. Seventeen of these had been given psychological examinations and ranged in menta lage from 8.5 to 18+.

V. Subjects at either of the two hospitals suffering from alcoholic psychoses, 34, including: chronic alcoholism with deterioration, 11; alcoholic hallucinosis, 8; unclassified alcoholic psychoses, 4; delirium tremens, 3; acute alcoholism, 3; Korsakow's psychosis, 2; chronic alcoholism (paranoid), 1; alcoholic dementia, 1; habitual drunkenness, 1. The twelve of these who were tested ranged in mental age from 8.7 to 16.5.

VI. Subjects at either of the two hospitals suffering from syphilitic psychoses, 21, including: general paresis, 15; neurosyphilis, 5; taboparesis, 1. Of these only one received a psychological examination, and he graded at mental age 9.2.

VII. Subjects diagnosed as psychopathic personalities, 20.† Nineteen of these cases were given psychological examinations, and they ranged in mental age from 11 to 17.

* It was thought advisable to divide the normal subjects into these two groups, since the difference in social status between the patients at the State hospitals and the normals in our superior group was so great that it might conceal any difference due to mental condition. The type of patient at the hospitals may be seen from the following list of occupations of subjects used in this investigation: housewives, 23; no occupation, 14; housemaids, 12; laborers, 10; students at various schools, 13; factory workers, 5; clerks, 4; teachers, 3; teamsters, 2; polishers, 2; electrical assistants, 2; coachmen, 2; section foreman, auto salesman, book seller, steamfitter, switchman, bootblack, carpenter, "sprinkler work," engineer, fireman, grocer, blacksmith's helper, piano tuner, attendant, freight handler, reporter, business man, tinsmith, machinist, physician, elevator man, oiler, steward, waiter, baker, bartender, furniture sandpaperer, lawyer, sheet-metal worker, letter carrier, cashier, painter, arc trimmer, conductor, chemical engineer, cook, paper roller, bookkeeper, nurse, weaver, each 1, to say nothing of the considerable number whose occupation was not ascertained.

† This diagnosis is made at the Psychopathic Hospital following Kraepelin, and covers cases whose defect is not intellectual. Such cases are diagnosed elsewhere as defective delinquents constitutional inferiors, feebly inhibited, etc.

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VIII. Subjects at either of the hospitals suffering from manic-depressive insanity, 12, including: manic, 7; depressed, 3; mixed, 2. Two of these cases were given psychological examinations, and graded at thirteen and at fourteen years, mental age.

IX. Patients at the Psychopathic Hospital who were diagnosed as having "no mental disease," 21. They ranged in mental age from eight to seventeen. It seemed unfair to class this group of subjects as normal, because their mere presence at a psychopathic hospital indicates that their reaction to life is not normal, even if the cause cannot be laid to mental condition.

X. Patients at the two hospitals who cannot be arranged in groups by diagnoses because of the few cases for each disease, 60. As we have used the data obtained from these subjects in our discussion where the question was one of age or sex and not one of diagnosis, it may be well to list them here: cases where the hospital staff disagreed as to diagnosis, 17; arteriosclerotic psychosis, 10; psychoneurosis, 5; presenile psychosis, 3; retarded, 3; subnormal, 3; hysteria, 2; speech defect, 2; epilepsy, 2; arteriosclerosis *plus* chronic alcoholism, arteriosclerosis *plus* cardiorenal changes, post-apoplectic arteriosclerosis, involutional melancholia, Addison's disease, psychopathic constitution, unclassified paranoid, symptomatic depression, insane epileptic, post-epileptic psychosis, neurasthenia, thyrogenic myxedema, senile dementia, each 1.

There are thirteen negroes among our subjects: feeble-minded, 5; alcoholic psychoses, 3; general paresis, psychoneurosis, hysteria, retarded and "no mental disease," each 1.

Method.

The Müller-Lyer illusion was drawn in the center of a sheet of white paper 15 by 9 centimeters, as follows: width of all lines, .05 centimeters; length of horizontal bounded by arrow heads, 3.5 centimeters; length bounded by arrow feathers, 4 centimeters; arrows formed by lines, 5 centimeters in length, drawn at an angle of 30° to the main line.

The apparatus for the tactual experiments was an æsthesiometer consisting of a fiber-board base one-half inch square in cross-section into which from below were set, to serve as stimulators, two conical points of hard rubber projecting five-eighths of an inch at a permanent distance of 4 centimeters from tip-center to tip-center, and from above a heavy U-shaped wire projecting 3 inches upon which a rubber handle slid easily and

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noiselessly. The weight of the instrument, effective for stimulation, was exactly 30 grams. The tips of the conical points above mentioned were given a spherical form by the following procedure: The cone was turned down till the smaller end had a diameter slightly less than 1 millimeter. This tip was then roughly shaped. A hollow hemisphere of 1 millimeter diameter was now formed by placing a steel ball in solder and removing it when the solder hardened. The cone was then placed in a drill-press, and its tip made hemispherical by rotation in flour of emery in the hemispherical depression. The resulting diameters of the tips, measured by a micrometer caliper, were 1.05 and 1.08 millimeters.

The experimenter in most cases was the writer. Tests were given, however, to about 40 men (patients and attendants at the Psychopathic Hospital) by Dr. F. J. O'Brien, and the Müller-Lyer illusion was shown to 42 normal men and women by Mrs. J. W. M. Nash, an experimenter with college training; to 46 normal men and women by Mrs. E. B. Curtis, an experimenter with some experience; and to 88 subjects (patients and hospital employees) at the Danvers State Hospital for the insane by Dr. Anna H. Kandib.

It was found advisable to try first the illusion and then the tactual test, for when the reverse order was used subjects sometimes imagined that a practical joke or a painful experience was coming. A preliminary statement was made to the normal subjects, to the effect that the writer was collecting data as to the differences in replies given to two questions by normal and abnormal subjects, and the assurance added that they were considered as normal. The other subjects were usually given the tests at the end of the routine hospital psychological examination, so that they took the tests as a part of the regular examination. In most cases in which the abnormal subjects did not have the full psychological examination, they were so accustomed to tests that they took ours as a matter of course. No subject ever refused to answer the question about the illusion. An occasional psychotic patient was unwilling to be touched unless he could see his arm during the operation; and in these cases the æsthesiometer test could not be carried out.

The illusion was presented with the horizontal bounded by arrow heads to the subject's right. The form of question used was: "Are the two halves equal?" If the subject answered "No," he was asked, "Which is the longer?" If the subject

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replied, as some four or five of our superior normals did, "Two halves are always equal," or if the subject failed to comprehend the meaning of the question, the experimenter said, "I mean, is it the same distance from here [pointing to the tip of the extreme left arrow] to here [pointing to the middle arrow] that it is from here [pointing again to the middle] to here [pointing to the right arrow]?" With an occasional low-grade patient it was necessary to add, "Is this line [pointing left] just as long as this line [pointing right]?" The directions for the tactual experiment were as follows: "Now, I want you to put your right arm out here on the desk [or table, or chair-arm], and rest it down comfortably; then I want you to shut your eyes. I am going to say, 'Ready,' and then I am going to press down lightly on your arm. Afterwards I want you to tell me what you felt." The æsthesiometer was applied longitudinally to the volar surface of the right arm, with the lower point about 2.5 centimeters above the upper carpal fold, and avoiding, as far as possible, cords and veins. The subject never knew before the test that any apparatus was to be used, and practically no subject saw it even after reporting. In about half of the first few cases, the answers were so indefinite (as, for example, "little pricking") that it could not be said how many pressures the subject felt. The further request, "Show me where," was therefore introduced. In response to this demand the subject usually pointed to the places on the arm where pressure had been felt. This report was then recorded as "one point," "two points," "line," "line across arm," "area" and "small area." When a subject touched his arm with one finger and held that finger on a definite spot steadily, a record of "one point" was made; if, however, he moved the finger around over an area of perhaps twice the size of the end of his finger, a record of "small area" was made; if he moved his finger (or hand) over a comparatively large portion of his arm, a record of "area" was made; if he moved his finger in a definite line the record was "line," or "line across arm," according as he moved longitudinally or transversely; and if he pointed to two definite places on his arm, or placed two fingers in definite places, the record "two points" was made. On the whole, these records give a satisfactory statement of the number of points felt, for they never disagree with the first reply of the subject when that reply is exact about number of pressures felt, and we can but suppose that if the inexact replies had been given better expression there would be agree-

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ment there. A slight misunderstanding may arise, however, from statements of "area," since it is not clear whether pointing to an area means that a broad pressure was felt, or that the location of a small point was uncertain. Occasionally, after stimulation in the tactual test, the subject seemed still to be waiting. In such a case the question was repeated; and then, if no answer came, or if the subject said, "I don't know," or "Nothing," he was asked, "Did you feel me touch you?" In all but one or two cases the subject replied, "Why, yes, of course;" and he was then asked to point out where he had been touched, and the expression of judgment was recorded. This kind of response was given six times only. One difficulty with the instructions used is that subjects who are unaccustomed to psychological experiments, or who are not sufficiently intelligent to grasp the entire meaning of the directions, open their eyes at the "Ready" signal, apparently thinking that the test is over. This, of course, interrupts the experiment before the stimulus is applied, and necessitates further explanation. With the abnormal and inferior subjects it was therefore found advisable to hold a paper over the part of the arm stimulated, so that the subject could not see the æsthesiometer in case he did open his eyes. Four subjects (1 general paresis, 3 arteriosclerosis) were unable to feel anything, even after four attempts.

Results.

We have divided our results for the tactual experiment into those who felt two points definitely and those who did not feel two points. All our classes of "line" and "area" are thus counted as "not two points." Seven of our superior normal subjects and one average normal (3 male and 5 female) reported more than two points, and these we have grouped in the "not two" column, although if the difference be taken as one of discreteness it might be more reasonable to place them with the "two points." The results for the illusion are divided into those saying that the "right" (horizontal bounded by arrow heads), those saying that the "left" (horizontal bounded by arrow feathers), was the longer, and those who called the two horizontals "equal."

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TABLE I. — *Results of Tests of Tactual Sensitivity and Susceptibility to the Müller-Lyer Illusion.*

Subjects grouped by Diagnosis.

	Æsthesiometer Test.			Müller-Lyer Illusion.			
	Number of Cases.	Percentage of judgments.		Number of Cases.	Percentage of judgments.		
		"Not Two."	"Two."		"Right."	"Equal."	"Left."
Superior normal, . .	77	77	23	154	47	53	0
Average normal, . .	49	69	31	72	63	36	1
No mental disease, . .	17	100	0	20	95	5	0
Psychopathic personality, .	20	100	0	20	65	35	0
Manic-depressive, . .	9	89	11	11	100	0	0
Alcoholic psychoses, . .	24	100	0	32	75	25	0
Syphilitic psychoses, . .	15	93	7	21	86	14	0
Dementia præcox, . .	27	100	0	60	78	20	2
Feeble-minded, . . .	150	97	3	157	80	15	5

Subjects grouped by Mental Age.

4.5- 5.4, ...	1	100	0	0	–	–	–
5.5- 6.4, ...	2	100	0	2	50	0	50
6.5- 7.4, ...	16	94	6	15	87	13	0
7.5- 8.4, ...	31	100	0	34	64	18	18
8.5- 9.4, ...	39	100	0	45	89	9	2
9.5-10.4, ...	26	96	4	26	96	4	0
10.5-11.4, ...	41	98	2	42	76	24	0
11.5-12.4, ...	29	100	0	35	89	11	0
12.5 and up, ...	56	96	4	58	78	22	0
Normals, ...	126	74	26	226	52	48	0

Subjects grouped by Sex.

Male, ...	135	91	9	195	61	39	0
Female, ...	309	91	9	432	74	24	2

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TABLE I. — *Results of Tests of Tactual Sensitivity and Susceptibility to the Müller-Lyer Illusion* — Concluded.

Subjects grouped by Chronological Age.

	Æsthesiometer Test.			Müller-Lyer Ilusion.			
	Number of Cases.	Percentage of judgments.		Number of Cases.	Percentage of judgments.		
		"Not Two."	"Two."		"Right."	"Equal."	"Left."
0-14.	24	96	4	30	90	10	0
15-19.	59	98	2	71	72	27	1
20-29.	177	86	14	187	65	32	3
30-39.	73	99	1	100	70	29	1
40-49.	45	93	7	90	78	21	1
50-59.	32	97	3	79	63	37	0
60-69.	6	100	0	35	54	46	0
70-79.	2	100	0	7	86	14	0
80-89.	0	0	0	4	100	0	0

The results of the experiments are given in Table 1. If we consider first the results of the tactual experiment, we find that the percentage of normal subjects who report "two" is much larger than the percentage of abnormal subjects giving that response. Unfortunately the average per cent. of "two" judgments by the normals is so low (about 26) that there is little chance for differences between the classes of abnormals to appear. In our choice of the distance used we were misled by laboratory findings on superior, psychologically trained adults to choose the 4 centimeter distance. If the distance between our æsthesiometer points had been greater, doubtless a greater per cent. of abnormals would have given the judgment "two," and we might have found decided differences between, for example, psychopathic personalities and the feeble-minded. All we can say is that, considering patients diagnosed as "no mental disease," "psychopathic personality" and "manic-depressive insanity" to be mentally nearer normal than the other psychotic patients,* and considering the "alcoholics" and "syphilitics" as nearer to normal than the "dementia præcox" and the "feeble-minded,"

* We do not claim that these statements of nearness to normality will hold true for the average of all cases of the different diseases, but merely that a physician who knows all the cases used in the Psychopathic Hospital, and the writer, who tested most of these cases, agreed that the arrangement held good for this particular group of cases.

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then the highest per cent. of judgments of "two" among the psychotic was attained by one member of the group next to the normal, and the next highest per cent. by a member of the next group. However, when we arrange the subjects in such groups, and compute the average performances by groups, no differences appear between the abnormal groups. Our number of cases is of course small for each diagnosis save that of feeble-mindedness, and not too much reliance can be placed upon the results. It is rather surprising that the number of average normals reporting "two" is greater than the number of superior normals giving that judgment. On the face of them, these per cents. seem to be against the general tendency of results, but there is a possible explanation of the difference. It will be remembered that we had a number of superior normals and one average normal who reported "more than two," and these we grouped with the "not two." If, on the contrary, we should group these with the "two," on the basis of discreteness of impression, we have 32 per cent. of the superior normals and 33 per cent. of the average normals reporting "two." We find, then, little difference between the two classes of normals.

Passing to the results classified by mental age, we find again a marked difference between the per cent. of "two" judgments given by those of normal (though unmeasured) mental age and those grading at a low mental age. If we group our subjects as "normal adult intelligence" and "subnormal intelligence" we find judgments of "two" given by 26 per cent. of the former, but by only 2 per cent. of the latter group. It is rather surprising that we have no marked changes in the per cent. with advancing mental age, for we might expect that those having very low mental ages would be correspondingly unresponsive to tactual stimulation. It is true that, as we glance down the table, we find the 0 per cent. predominating at the low mental ages, but the differences are so slight as to make it unsafe to draw hard and fast conclusions.

When the subjects are grouped by sex we find no difference whatever in the responses. When the subjects are grouped by chronological age we find again no systematic increase or decrease. The reason for the large per cent. of "two" judgments at age twenty is not clear, unless it be due to the fact that there are many more cases at this age, and the chance that the per cents. at the other ages would be raised if more cases had been tested.

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In general, then, we find decided differences between the normal and the abnormal in reaction to tactual stimulation, and also a decided difference between normals and persons grading at a low mental age. No differences appear, however, when the subjects are grouped by sex or by chronological age. It seems possible, of course, that when they are grouped by sex and by chronological age the results are cut across by the intelligence factor, so that any age or sex differences which are really there are concealed.

The results for the illusion test show that the superior normals are more apt to call the two horizontals "equal" than are any of the other groups of subjects.* Whether this result is due to superior mental ability, or to the fact that twenty-four members of this group had "seen" the illusion before, is not clear. Of those who had "seen" the illusion before 86 per cent. gave the judgment "equal." The average normals and the psychopathic personalities give the next largest per cent. to the superior normals. An interesting point about this table is the distribution of cases reporting the left horizontal as the longer. Only one case among the normals and groups near normals gave such a reply. He is an average inhabitant of a country village, who runs a small milk business, owning, perhaps, ten cows. His reply was, "Well, if you don't pay any attention to those cross-marks, you can see that this one is the longest." The other cases giving this response were eight feeble-minded girls (mental ages, 6.2, 7.7, 7.8, 8.1, 8.1, 8.2, 8.2 and 8.6) and one dementia præcox patient at Danvers, who is reported as "much deteriorated." The probability is that these abnormal subjects were of such low grade mentally that any question concerning comparison of lines which were not placed one over the other would have been too difficult for them to answer. The normal subject evidently was perfectly capable of understanding the question, so that the above reasoning cannot serve for his case. It may be interesting to note that two superior normals suggested the possibility of the "left" being the longer. Both of these, however, were reflective, not immediate, judgments.

Passing to the grouping by mental ages we find here a decided increase in the per cent. of "equal" answers with increasing mental age. In the first place, the 48 per cent. given by the

* There is a possibility that our wording "Are the two halves equal?" suggests equality to the subject. The wording was chosen, however, with an effort to eliminate suggestion as far as possible. In our opinion it has succeeded to a great extent. At any rate, if it does suggest, there is no reason to suppose one group would be affected more than another.

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normal subjects is far ahead of 24, the largest per cent. given by any inferiors; and if we arrange the subjects in groups covering two years of mental ages, we find for ages 5.5 to 7.4, a per cent. of 6.5; for 7.5 to 9.4, a per cent. of 13.5; for 9.5 to 11.4, a per cent. of 14; and for 11.5 up, a per cent. of 16.5; and then the jump to the normals at 48 per cent. Here, again, as in the case of the first section of the table, we find answers of "left" appearing only at the low mental ages. In combining the two classes of normals we have so many cases that the one case giving "left" does not appear in the table of per cents. in round numbers.

When the subjects are grouped by sex we find the males giving a larger number of "equal" responses than the females. The fact that 2 per cent. of the females gave "left," while 0 per cent. of the males gave that reply, is easily explained by the fact that the entire group of feeble-minded cases tested at Waverley were females, and this group may, in fact, influence the entire table. We had no similar group of feeble-minded males. It seems possible that this large group of feeble-minded girls is also influencing the part of this table which relates to the tactual experiment, thus concealing a possible greater sensitivity on the part of females in general. If this is true it simply strengthens our conclusion that diagnosis, not sex, is the determining factor in our results, although in an investigation in which the numbers for the sexes were more nearly equal a slight sex difference might still appear.

When the subjects are grouped by chronological age we have again no regular increase or decrease in kind of answer with increasing age, except that there is a tendency in our subjects for ages under 20 to give the answer "equal" less often than do the older subjects. Perhaps the adults have learned by the age of 20, if they are ever to learn it, that "things are not always what they seem."

In general, then, in the illusion test we find, as we found in the tactual experiment, that the normal subjects give a larger per cent. of correct replies (considering "equal" as more nearly correct than "right") than any of the groups of abnormal subjects. The difference once more holds good for the arrangement by mental ages. With the illusion, however, we find a tendency for females, and for subjects under a chronological age of 20, to be more suggestible for inequality than other subjects.

We have now discussed the main arithmetical results obtained

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from our investigation. There remain, however, a few points of interest in regard to unusual replies given in each of the tests. We find, for example, a number of subjects reporting sensations other than pressure for the tactual experiment. Twelve subjects reported temperature; 6 gave "warm" (1 average normal, 1 psychoneurosis, 1 psychopathic personality, 1 dementia præcox, 1 delirium tremens and 1 insane epileptic); 3 gave "hot" (all feeble-minded); 1 (average normal) gave "cold;" 1 (average normal) gave "cool;" and 1 (neurosyphilis) gave "burning." Four subjects (2 average normals, 1 psychopathic personality and 1 dementia præcox) reported "electricity," or "electric shock."

The question of localization of pressure felt may also be of interest. No record was kept of the distance between the pressure given and its localization by the subject, though it was evident to the experimenters that as a rule localization was very inexact. The record which we did keep we have already described as a report of "one point," "two points," "line," "line across arm," "area," and "small area." The normals were the only class ever reporting more than two points felt. The varieties of localization arranged in order of frequency for all our subjects together are: "one point" (by far the most frequent, about 80 per cent.); "line;" "two points;" "small area;" "area;" and "line across arm." The "line across arm" was never given except by the normals and two groups near normal, the "no mental disease" and the psychopathic personalities. The "line" and the two "areas" give no consistent results for the different diagnoses. We did not consider the data on localization (gathered merely to determine whether one or two points were felt) of sufficient accuracy to warrant any compilation of per cents. by age, etc.

The question of the stimulus-error is one that might be expected to be of interest in our tactual problem; but it is clear that our instructions were such as to give the non-psychological subject a distinct bias toward that error. It will be remembered that we told the subject to "tell us what he felt." It is evident, at least in the light of our results, that the average person takes "what" to mean "what thing." It is consequently difficult to divide our answers into those showing the stimulus-error and those not showing it, for the answers were in general so brief that the investigator must put his own interpretation upon them; for example, one subject answers, "Just a touch." The in-

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vestigator considers this to be the untrained person's equivalent for "a pressure." The next subject reports, "You touched me," and the investigator infers the stimulus-error. The probability is, however, that both subjects meant the same thing. Considering our results roughly we may say that superior normals tend to show the least stimulus-error,* and that the feeble-minded give a very large per cent. stimulus-error. Although we cannot state the amount of this error exactly, we can give some idea of the variety of names assigned to the stimulus. We find pin (51 times), pencil (43), finger (33), point (30), needle (17), paper (14), eraser (10), rubber (9), pen (9), wood (7), book (7), and electricity, cotton, hair, pasteboard, ball block, bubble, dot, button, watch, spool, feather, something blowing on arm, cloth, chalk, wheel and box, each one five times or less.

We have now discussed the immediate results of the tests used in our investigation, without reference to their theoretical bearing on the main problem, or the practicability of the method for use with such populations as may be met with on anthropological expeditions.

The fact that we obtained results which varied when the subjects were grouped in some ways (such as by diagnosis), and showed no consistent variation for other groupings (such as chronological age), is an argument for the assumption that by various groupings we may discover which of a number of given variables we are measuring. In this respect the method is surely as reliable as that of giving a number of trials to every subject. The second point in favor of the method of single stimulation is the ease with which the data may be arranged for statistical study. Given an "all or none" method of scoring, the answers are readily arranged, and are easily interpreted by the average reader. The third, and, in our opinion, the greatest, argument for the method is the ease with which tests are applied to a large number of subjects, and not limited to the selected group who enjoy being subjects for experimental investigations. It is, for example, ordinarily very difficult to persuade an average normal person to pass through a series of tests. He does not understand the point of view of collecting data, and takes the tests to be a means of showing some way in which he himself is "queer." If only one trial is used for each test the subject actually does not have time to meditate on conclusions to be drawn, and his interest does not flag before he finds the tests are over. It is

* Possibly because a number of them (at least 23) had had some psychological training.

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also possible to obtain replies from any subjects without telling them they are being tested. This is particularly true of tests like the illusion. One unsuspecting normal was, for example, shown the drawing, with this remark, "Somebody showed me this the other day, and asked me if the two halves were equal. What do you think?" Moreover, it seems probable that the attitude taken by all subjects to the first trial is more uniform than the attitude taken toward succeeding trials. We should expect to find groups of subjects saying to themselves, "Same thing right over again;" other groups saying, "I suppose this will be different;" and others, "Guess my first answer must have been wrong."

We conclude, therefore, that given field-conditions requiring simplicity of task, apparatus and method, and involving large numbers of subjects, the method of one trial given to all available subjects is superior to a method necessitating several trials given to fewer subjects, because —

1. The larger and more representative group of subjects may be tested.
2. No variable errors due to change of attitude toward the test can come in.
3. No errors due to practice can come in.
4. Other errors may be assumed to cancel one another in the large group.
5. In spite of the simplicity of response, the data may be arranged to show the influence of different variables.
6. The results may be checked easily by results from other groups.
7. The data are readily interpretable.

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ALIENISTS AND PSYCHIATRISTS: NOTES ON DIVISIONS AND NOMENCLATURE OF MENTAL HYGIENE.*

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Insanity and mental disease are not synonymous. Insanity is a legal concept; mental disease is a medical concept.

A man is either sane or insane, or indeterminate as to sanity; and there are no degrees of sanity or insanity. There is but one degree and but one kind of sanity or of insanity.

There are all degrees of mental health and mental disease. There are many kinds of mental disease.

Insanity depends upon medicolegal decisions. Mental disease is an affair of medicine alone. Sanity and mental health, decided by law and medicine, respectively, characterize the same human subjects; but sanity also characterizes many subjects of mental disease. Sane subjects of mental disease are subject to mental diseases — either mild or severe — that are of a kind that does not concern the courts.

It would even be entirely permissible to say that no man is either sane or insane until properly reviewed and adjudged by courts. Such is not the point here at issue. It is enough to claim that sanity and insanity are characters such that courts decide them within the limitations of accuracy of courts.

Sanity and insanity, accordingly, are legal, governmental, public matters. Mental health and disease are matters of individual medicine and individual psychology, and, while of familial, district, group or social interest, they do not necessarily approach governmental régime. Insanity is a public matter; mental disease a social, family or personal matter.

The above are commonplaces in the minds of many, perhaps of the most, advanced medical men. It is probable that many competent jurists hold identical conceptions.

* Being Contributions of the Massachusetts Commission on Mental Diseases, whole number 187 (1917.7). The previous contribution was by Josephine N. Curtis, No. 186 (1917.6), entitled "Tactual Discrimination and Susceptibility to the Müller-Lyer Illusion, tested by the Method of Single Stimulation." Published in the Titchener Commemorative Volume, "Studies in Psychology," 1917.

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I therefore propose that the medical specialists who are medico-legal aids be given the familiar and etymologically appropriate designation alienists, and that the term psychiatrists be reserved for those specialists who are acting as physicians only, — that the insanity expert be spoken of as an alienist, and the mental disease expert be called a psychiatrist.

Reports could then run: —

1. "As alienist, I consider this person insane. As psychiatrist, I consider this patient subject to general paresis."

2. "As alienist, I consider this person sane. As psychiatrist, I consider him in complete mental health."

3. "As alienist, I consider this person sane. As psychiatrist, I consider him subject to mental disease, viz., subject to a psychoneurosis of hysterical form."

4. "As alienist, I consider this person sane. As psychiatrist, I consider him subject to dementia præcox in a mild degree."

5. "As alienist, I consider this person sane. As psychiatrist, I consider him subject to paranoia of great severity. This mental disease (which I find as psychiatrist) I regard, in this case, as of no public interest (when I review the findings as alienist)."

These points and some others that may not be worth full presentation are given in parallel columns.

Alienists.	*Psychiatrists.*
Field: insanity, the insane.	Field: psychiatry, the mentally diseased.
Field: public, governmental, legal.	Field: social, private, medical.
Field: opinion for court use.	Field: medical, psychological and social diagnosis and treatment.
Decisions alternative: — Sanity *versus* insanity.	Decisions selective: — *E.g.*, syphilitic, feeble-minded, epileptic, alcoholic, coarse brain disease, symptomatic, senescent, senile, schizophrenic, cyclothymic, psychoneurotic, etc.[1]
Insanity implies mental disease.	Sanity consistent with mental disease of mild degree or of special type.
Sanity: insanity = 1 : 0	Mental disease of all degrees of many kinds.

The major divisions of mental hygiene[2] from a practical point of view are three: —

1. *Public, i.e.*, governmental, legal, forensic, statutory, official.

2. *Social, i.e.*, voluntary, privately managed, charitable, philanthropic, propagandist, prelegislative, auxiliary, initiative.

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3. *Individual, i.e.*, personal, private, object of medical diagnosis and treatment, having two subdivisions: —

(*a*) Medical (in a narrow sense), psychiatric.

(*b*) Medical (in a broader sense), psychopathological, employing both metric ("mental test") and qualitative (*e.g.*, analysis of instincts) methods.

Accepting these divisions of mental hygiene as approximations to modern view, I would now query whether the prevalent distinction between insanity and mental disease should not be followed by a corresponding improvement in the terms describing the public and non-public experts in mental hygiene. On the forensic side of the public division of mental hygiene let the alienist hold sway. In other divisions of mental hygiene than the public division let the psychiatrist work. Let both psychiatrists and alienists be mental hygienists.

Mental hygiene shows signs of being a larger category than psychiatry, working out an evolution somewhat like that of hygiene in general, with respect to medicine. We see signs of the following specialties in mental hygiene developing: —

1. *Institutional mental hygiene*, chiefly public, officially regulative, economic, State care, interstate relations, standardizing, statistical, architectural, engineering, sanitational.

2. *Forensic or medicolegal psychiatry.* The *psychiatric* features at a minimum, the legal at the maximum; experts here proposed to be named alienists, dealing with questions of alienation ("*alienistics*"?), not primarily with psychiatric questions.

3. *Practical psychiatry.* Forensic aspects remote, medical diagnosis and treatment dominant, home and dispensary treatment encouraged, psychopathic hospital encouragement of "voluntary" and "temporary care" relations of mental patients to ward treatment.

Somewhat newer and promising specialties are these: —

4. *Metric psychiatry.* Psychological psychiatry, *i.e.*, a psychiatry that uses methods developed by psychologists, commonly called "mental tests," for the purpose of diagnosis and treatment, not merely in the field of feeble-mindedness, but broadly in the study of deterioration, to determine degrees of both "mind-lack" and "mind-loss;" of value also in the third field, "mind-twist," for the exclusion of lacks and losses.

5. *Social psychiatry.* Developing from a conjugation of social and psychiatric concepts, — as social psychology has already developed from a conjugation of social and psychological con-

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cepts, — employing modern methods of social service investigation and care,[3] and aiming to make use of characterological and ethological categories and the available facts of the psychology of the instincts, behaviorism, vocational psychology and the like.

Concerning *social psychiatry*, it may well be claimed that a good portion of it is nothing but pious wish. At any rate, it might be maintained, should we not separate off the comparatively certain field of psychiatric social service (in which, *e.g.*, several American clinics are getting solid results) from that darkling portion of social psychiatry that lies next to social psychology? Perhaps.

A brief scheme of specialties made and in the making would comprise: —

Mental Hygiene.

1. Public division: —
   - A. Institutions.
   - B. Forensic psychiatry "alienistics."
2. Social division: —
   - A. Psychiatric social service.
   - B. Character handicap work.
3. Personal (medical) division: —
   - A. Practical psychiatry.
   - B. Metric psychiatry ("mental tests.")

I suppose it would be superfluous to add that these divisions, though they correspond to experts developed and being developed, do not imply utter disjunction of material or technique. These experts are all dealing with melioristic aims, and all use each other's evidence and technique.

It should also be redundant to say that any great further advance in mental hygiene and melioristics[4] hangs, like all advance in the past, on investigation and research.

Conclusions.

It is proposed that the term *alienist* be used of experts in the forensic or medicolegal subdivision of mental hygiene, dealing with *insanity*.

It is proposed that the term *psychiatrist* be used of medical experts concerned with *mental diseases*.

As a minor point in nomenclature, it is proposed to distinguish the *alienistics* of a case from the *psychiatry* thereof. As insanity stands to mental disease, so alienistics would stand to psychiatry.

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Alienistics would be primarily a branch of law; psychiatry a branch of medicine.

Five or six subdivisions of mental hygiene are mentioned as existent or developing.

Public mental hygiene has the two well-established subdivisions, institutional and medicolegal.

Social mental hygiene has produced effective social service. It is a question how far character handicap work can go; but there are signs of a specialty in mental hygiene here also, using practical psychiatric, social-service and social-psychological categories.

Personal or *individual* (medical) mental hygiene is founded on the achievements of practical psychiatry, which may now be regarded as a specialty independent of institutional mental hygiene and of "alienistics." But metric psychiatry is gaining ground, following the work of Binet, and "mental tests" promise to be of value not only in "mind-lack" and "mind-loss" questions of practical psychiatry, but also (at least negatively) in the field of character handicap work in employment and vocational choice.

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DEFECTIVES IN OUR PRISONS.*

By A. Warren Stearns, M.D.,

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The title is used so broadly that, lest the writer be accused of infringing on aspects of the field not his own, a word of explanation will be given. It is obvious that if one wishes to study medicine the hospital is the place for such study; and if psychiatry is to be studied, the State hospital is the proper place. So, to be especially interested in the problem of the criminal implies an interest in the broader social problems of crime, and psychiatry itself is no longer confining its efforts to inmates of hospitals, but is now working on the social problems of the insane.

As a physician I believe I can contribute two things toward the solution of the penal problem, — first, a method of study; and secondly, certain facts which have been obtained by using the method of individual study.

As to method. It is hardly fair to claim for medicine the exclusive title to the method of treatment depending upon diagnosis, but it must be admitted that doctors have developed and used this to a greater extent than most. If one goes back a hundred years and follows the sick man to the doctor, he finds two remedies are offered, regardless of the pathological condition existing, namely, purging and bleeding. This is exactly analogous to the modern treatment of the criminal. Regardless of the diagnosis, the treatment is fine or jail.

Investigation into penology in the past has dealt with crime and we find elaborate tables giving the name of the crime, the season of the year, the name of the article stolen, etc., but these figures have had little or nothing to do with diagnosis as far as the individual is concerned. Treatment has had to do largely with the possible effect upon society.

At the present time, if a man with a headache goes to a hospital, he is not given morphine to dull his sensibility to pain,

* Being Contribution of the Massachusetts Commission on Mental Diseases, whole number 188 (1917.8). The previous contribution (1917.7) was by Doris M. Holmes, entitled "An Analysis of Two Hundred Cases of Delinquency." Read at a conference of the Prison Association of Rhode Island, in Providence, on Jan. 13, 1917.

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but the eyes, the stomach and the urine are examined, and a cause for the headache is sought. In other words, a diagnosis is made, and then, and not until then, is treatment administered. It is not enough to know the cause of headache in general and administer treatment, but we must know the cause of this particular headache. We are familiar with the wonderful progress made in medicine since this method has become universal. It seems certain that equally good results will come from the application of this method to the criminal class.

It must be borne in mind, of course, that the diagnosis may not be strictly medical; it may be social; it *must always be personal.* This method has been tried out already, and a few of the results will show its value, though but a beginning has been made.

It may be made clear that the word *criminal* is not definitive. To say that a man is a criminal in no way describes him; it merely signifies that position he holds in society in a most vague way. It does not even give us a clue to his personal morality or character, as oftentimes what seem to be the real rights of the individual must be limited for the good of society, as in automobile legislation. So, though older studies of crime have given society some aid, they are of no value if the treatment of the individual is to be considered.

There has existed for ages a belief that, though any one of us may commit a crime, there is a group or special type of individual who is prone to delinquency. Lombroso, perhaps, first emphasized this. It was his misfortune that psychiatry was so little advanced in his time that he was unable to see the sameness of his born criminal and our imbecile. *Now,* when we begin the study of an individual criminal, we immediately get at a more fundamental idea of his nature. For instance, under the older classification we find crime divided into such groups as against the person, against property and against public order. This gives us no insight as to the individual or his needs.

After studying a group of felons at the Charlestown State Prison,[1] a more descriptive grouping immediately suggested itself: —

First, crimes in which the individual seeks monetary gain. In the struggle for existence, certain individuals drift into the lower ranks of society and become dependents. The average man is usually able to make an honest living, and recognizes the truth of the old adage, "Honesty is the best policy." So, though all

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types may be dishonest and get arrested, the majority of this group are quite obviously handicapped. They are often the unfortunate among us rather than the bad.

This may seem somewhat opposed to Aschaffenberg's theory of economic necessity as a cause of crime, thereby putting the responsibility more on society than on the individual. Needless to say, the feeble-minded are very numerous among these handicapped ones.

Second, crimes due to a manifestation of the sexual impulse. These individuals are frequently abnormal; many are feeble-minded or alcoholic, and many are sex perverts.

Third, crimes due to emotion, such as rage, jealousy, revenge, etc. These are quite often alcoholic, insane or feeble-minded.

This grouping,* as is readily seen, suggests the underlying motive for the crime, showing it to be quite a personal matter, and to some extent describes the individual. It usually indicates quite definitely the line of treatment which should be followed.

Again, we may group our individuals in such a way that we not only explain the commission of the crime but suggest a remedy.

Group No. 1. Crimes due to New Social Conditions. — If we search colonial records we find a large proportion of criminal action to have been directed against the Indians. They were not acquainted with European customs and standards, and constantly came into conflict with the law. And yet, if we read Red Jacket's speech to the Massachusetts missionary, we are inclined to believe that the Indian was quite as normal as the white man. The high percentage of Italians in Charlestown is another example of this group.

Group No. 2. Environmental Cases. — We frequently see street urchins who have either picked up or been actually taught to earn their living dishonestly; who have never had an opportunity to learn standards of correct living, and whose crimes seem to be quite largely due to environment.

Group No. 3. The Accidental Group. — This is a small group and one which need not be treated specifically. Punishment will never entirely prevent accidents.

Group No. 4. The Voluntary Criminal. — There are certain individuals who are well endowed mentally, and who have no excuse for doing wrong, who voluntarily commit crimes. Punishment, for its deterrent effect, seems to be applicable to this group.

* These groups correspond in a general way to Gordon's greed, lust and malice.

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Group No. 5. The Physically Handicapped. — Every one who has worked with criminals is impressed with the large number of sickly, maimed and deformed individuals who need medical treatment and social service aid.

Group No. 6. The Drug and Alcohol Addicts. — A very large group; more than half the arrests in Massachusetts are for drunkenness, and a large percentage of other crimes, such as assault, are directly due to drunkenness. The folly of locking these individuals up for a few days and then turning them loose indiscriminately is obvious. The incurable and demented should be segregated; the others should be supervised.

Group No. 7. The Insane. — Two years ago 7 out of 28 indictments for murder in Massachusetts were against individuals obviously insane. The huge percentage of dementia præcox patients among our vagrants is well known.

In my Bridgewater series [2] it appeared that 7 per cent. of all persons sentenced for vagrancy were so obviously insane that a physician's examination was not necessary to demonstrate the fact.

Group No. 8. The Socially Irresponsible. There are certain individuals, not insane and not feeble-minded, who yet are neurotic and unstable, and who are socially irresponsible. These individuals can be recognized, though the exact name that should be given them is not settled upon; if they commit a crime they should be treated as irresponsible persons.

Group No. 9. The Feeble-minded. This group probably more than any other constitutes what might be known as the typical criminal. Mental defect is found in all grades of criminals. In Massachusetts, over 50 per cent. of a series of prostitutes were found to be feeble-minded; 24 per cent. of the inmates at the Reformatory for Women; 15 per cent. at the Reformatory for Men; 23 per cent. at the Charlestown State Prison. If the feeble-minded patient is actively anti-social permanent segregation is the only rational method of handling the case. The matter of prevention concerns this group especially, as the female feeble-minded delinquents are notoriously prolific.

It is fair to inquire as to the purposes of penal procedure. There can be but two if the old idea of "An eye for an eye and a tooth for a tooth" be left out, — first, and perhaps more important, the protection of society; second, the treatment of the individual offender.

The same purposes are behind our modern treatment of a smallpox patient. We isolate to protect society; we treat to cure

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the individual. Our present penal procedure is as though we were content to isolate our smallpox patients and let them take care of themselves, instead of sending them to a first-class hospital and giving them the best of care. Mr. Osborn aptly remarks that it should be pointed out that if the analogy is to be correct, the smallpox patient should be sent out in a given number of days, whether he is well or not.

Although these two purposes merge one into the other, it seems evident that the protection of society must always be left with the court, as the one studying the individual is at times inclined to sacrifice society for his patient. So a maximum and minimum sentence is probably desirable, the former for the protection of the individual; the latter for the protection of society. It would seem impossible, with the limited time at the disposal of the court, to determine not only guilt, but an accurate diagnosis, and plan treatment for each individual; and so, as is done in Ohio with juveniles at present, the court should determine guilt, and subsequent study of the person's past life and present mental equipment should determine treatment.

Treatment should fall into four main groups: —

First. — Reform: this should be particularly applicable to intelligent individuals whose delinquency was due to environment or habit. It applies to certain of the alcoholics.

Second. — Education: this should provide that each man leaving prison should have a common school education and some vocational training as an aid to adequate self-support.

Third. — Medical care: though most prisons have a "jail physician," one rarely finds adequate medical attention given convicts.

Fourth. — Profitable occupation: this should apply to those individuals who are more or less permanently segregated.

The outlook is favorable. Though the ideal has not been reached, we find, scattered all over the country, workers who are being well supported, and there is every reason to hope and believe that the care and treatment of the criminal will become a science and an art rather than a job.

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THE BEHAVIOR OF THE WASSERMANN REACTION IN CASES RECEIVING MIXED TREATMENT.*

By Harry C. Solomon, M.D., of Boston,

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During the past three years it has been our custom to have a Wassermann reaction performed on the blood of all patients receiving anti-syphilitic treatment each time an injection of salvarsan† is given. In this manner we have been able to follow any changes occurring in the reaction from week to week. During this period of time a large series of cases have been studied, many of whom have had sixty or more injections of salvarsan during a period of months. These patients fall into the groups called tertiary syphilis, latent syphilis, cerebrospinal syphilis, general paresis, tabes dorsalis and congenital syphilis. Frequent lumbar punctures have also been performed on the majority, so that it has been possible to follow not only the reaction in the blood serum, but also in the spinal fluid. An analysis of these findings brings out a number of points which have considerable significance in the clinical interpretation. It is to be borne in mind that none of these points are given because they are especially new, but rather because one is likely to forget the cautions which they indicate.

In the first place, as is well known a negative Wassermann reaction in the blood serum is no proof that the patient is not suffering from syphilis. This is most conclusively shown, we believe, in those cases in which the spinal fluid gives a positive Wassermann reaction, and in which other signs indicative of syphilitic involvement of the nervous system are proved while the serum Wassermann reaction is negative. This finding has occurred in a number of our cases of general paresis and cerebrospinal syphilis, and hardly needs any case illustration. A very interesting case, somewhat similar to the rule mentioned, may be quoted, however. The patient, a man of forty-two years of age, acquired syphilis six years before coming to the hospital. He was vigorously treated, chiefly by mercury, from the period of

* From the Boston Psychopathic Hospital. Reprinted from Medicine and Surgery, May, 1917.

† Diarsenal and arsenobenzol have been used in many cases instead of salvarsan.

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infection until six months before being seen. At the end of about six years of treatment his Wassermann reaction in the blood serum was reported negative on several occasions, and treatment was discontinued. Six months after discontinuance of treatment he began to show signs of mental disease, — namely, memory loss; periods of confusion; peculiar actions; speech defect. The Wassermann reaction at this time was again found to be negative on three different tests made in three different laboratories. In spite of this, the diagnosis of general paresis was made, and this was apparently borne out by findings in the spinal fluid, in which a positive Wassermann was found. The patient was put on antisyphilitic treatment, consisting of biweekly injections of salvarsan, .6 grams each; biweekly intramuscular injections of mercury salicylate; and potassium iodide by mouth. After four injections of salvarsan and mercury salicylate, and after having had four negative Wassermann reactions, the fifth Wassermann test was returned strongly positive; the sixth test, obtained at the time of the sixth injection, was weakly positive; the next four Wassermann reactions obtained at the time that intravenous injections were made were again returned negative, while the next reaction was positive, and since then a series of negative reactions have been obtained. Obviously, the negative reaction previously obtained in the blood serum did not mean that syphilis was no longer active in the body, as shown by the spinal fluid test, nor did it mean, as we learned, that a later test of the blood serum would not be positive.

At times a positive Wassermann reaction may be made negative by a very small amount of treatment. This is seen in certain cases of latent and tertiary syphilis, in which after as few as two or three injections of salvarsan the Wassermann reaction will become negative, and remain negative over a period of a good many months of observation. This same result occurs, as we have found, in certain cases of general paresis in which after a few injections of salvarsan a Wassermann reaction becomes negative in the blood serum; however, in these cases the reactions in the spinal fluid may be entirely unchanged. Thus we have learned that in the prognosis of cases of syphilis of the central nervous system the blood serum Wassermann test is of little value.

While the Wassermann reaction may become negative in the blood serum under treatment and remain negative, on the other hand, it may become positive again while treatment is being con-

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tinued. An illustrative case is that of a man, thirty-two years of age, with the symptoms of general paresis, — a positive blood and spinal fluid. Variations in the Wassermann reaction may be indicated + for a positive, — for a negative. A test is taken at each injection of salvarsan, except where a zero is shown, which indicates that no test was made at this injection. The findings in the blood serum were as follows: —

+ + — 0 + — + — + + 0 + + — — — + — — —.

Numerous instances of this sort might be produced. In many of the cases, however, especially of those of syphilis of the central nervous system, we find no such fluctuation in the Wassermann reaction, which will remain positive despite the most vigorous treatment. Thus we can mention a case of neurosyphilis which was considered to be of the paretic type in which more than sixty injections of salvarsan produced not a single negative reaction. Again we have a case in which the Wassermann reaction remained consistently positive, and only after fifty injections did it become negative, and has since remained negative. Similar findings are true in latent syphilis, not involving the nervous system, where we have been unable to obtain a negative Wassermann reaction despite more than thirty injections of salvarsan during a period of a number of months.

In contrast to the cases of neurosyphilis, in which the blood Wassermann reaction was made negative while the spinal fluid Wassermann reaction remained positive, we have cases in which the spinal fluid has become negative to the Wassermann test and other tests as well, while the blood serum has remained strongly positive, despite the most vigorous treatment. Thus in the case of a man of forty-nine years, presenting the symptoms of cerebrospinal syphilis, the spinal fluid became entirely negative and all symptoms disappeared after fifteen injections of salvarsan, whereas the blood has remained persistently positive after thirty injections of salvarsan re-enforced by mercury and iodide. A similar result was obtained in a case diagnosed as general paresis. In this case after fifty-three injections of salvarsan the spinal fluid Wassermann reaction became negative while the blood remained positive; ten more injections were given in the following nine months and the blood has continued persistently positive.

These illustrations demonstrate that neither the Wassermann reaction in the blood serum nor in the spinal fluid taken alone

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is sufficient evidence to suggest a cure of syphilis. Nor does the fact that both the blood and spinal fluid are negative prove that a cure has been obtained. Thus, in the case of a printer, forty-five years of age, who developed convulsions six months after his infection, and who had a positive blood and spinal fluid, both became negative under treatment, and have remained entirely negative, yet from time to time convulsions still occur, showing that we have not obtained a cure. Probably more convincing is the case of an inspector, forty-nine years of age, who was diagnosed both from mental, physical and laboratory symptoms as a case of general paresis, but who cleared up mentally under treatment, and whose laboratory tests all became negative. Despite the negative findings in this case, treatment was persevered in. However, the spinal fluid a few months later again gave a positive Wassermann reaction, as well as other tests, showing an inflammatory process, although the Wassermann reaction in the blood serum remained negative. In this case we see a Wassermann reaction in the spinal fluid become negative under treatment, then return to positive, although treatment is continued, and although the blood Wassermann reaction remains negative. This should teach us that the negative Wassermann reaction does not mean a cure.

Very similar results regarding the Wassermann reaction are found in cases of congenital syphilis under treatment. An illustration is the case of a boy seven years of age with a positive Wassermann reaction and signs of congenital syphilis. After many months of treatment the Wassermann reaction became negative, the treatment was discontinued for a period of a year, and the Wassermann reaction was again found to be positive; after three injections of salvarsan it became negative. Having been taught in this case the fickleness of the Wassermann test, treatment was continued despite the negative reaction. After several treatments the Wassermann reaction again became positive, although treatment was being continued; again it became negative, and the patient is still under treatment.

The following schemata will illustrate the finding of the variation in the Wassermann reactions of cases in the different groups, all receiving treatment, in most instances the treatment being given once or twice a week, never less frequently than once in two weeks: —

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General Paresis.

1. Fifty positive reactions, no negatives obtained.
2. Fifty negative reactions, no positives obtained.
3. + — + — 0 + — + 0 + 0 + 0 + + — + — + 0 + + — + + — + + + — + + — + + + — +.
4. + + — + — + — + + + + — — — + — — — —.

Cerebrospinal Syphilis.

1. Thirty positive reactions, no negatives.
2. Twenty negative reactions, no positives.
3. + 0 + 0 0 0 + + + — + + — + — + — + — + — + — + — + + — + +.

Tabes Dorsalis.

1. + + 0 — — — + 0 + + 0 + 0 + — + + + + — +.

Congenital Syphilis.

1. + + 0 0 + 0 + + + 0 — — — — + — + — + + —.

SUMMARY.

1. A negative blood Wassermann reaction does not prove the non-existence of syphilis in the individual; nor is this proved by several negative tests.

2. A negative blood Wassermann reaction may exist in the patient having a positive spinal fluid Wassermann reaction.

3. A negative blood Wassermann reaction may become positive after several injections of salvarsan, where one salvarsan had no such provocative action.

4. A positive Wassermann reaction in the blood serum may become negative after a very small amount of treatment.

5. In some cases very large amounts of salvarsan (sixty injections) and mercury over a period of more than a year are insufficient to cause a Wassermann reaction to become negative.

6. The blood serum Wassermann reaction may become negative while the spinal fluid Wassermann reaction remains positive.

7. The spinal fluid Wassermann reaction may become negative while the blood serum Wassermann reaction remains positive.

8. Both blood and spinal fluid Wassermann reactions may become negative, and then either may return positive, even though treatment is continued.

9. Similar variations in the reaction of the Wassermann test may be found in the various groups of syphilitic disease.

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The cases on which the findings in this paper are based have been taken from tertiary syphilis, latent syphilis, cerebrospinal syphilis, general paresis, tabes dorsalis and congenital syphilis.

In conclusion we wish to emphasize the lesson we have learned by closely following the Wassermann reactions in the syphilitic cases under treatment, — namely, that a variation in the Wassermann reaction occurs very frequently, at one time negative and again positive, or that a number of negative reactions may be followed by positive reactions, although the patient continues under consistent intensive treatment. Our point is that one must be exceedingly careful in drawing conclusions from the Wassermann finding in cases under treatment, even though a number of negative reactions are obtained over a considerable period of time.

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BRUCK'S SERO-CHEMICAL TEST FOR SYPHILIS: A REPORT OF 400 CASES COMPARED WITH THE WASSERMANN REACTION.*

By Curtis E. Smith, M.S., Boston, and H. C. Solomon, M. D., Boston,

psychopathic hospital.

This new test for the diagnosis of syphilis by C. Bruck [1] has aroused universal interest. The scientific standing of Bruck and the simplicity of the technic led us to overcome our prejudice that has been the offspring of the numerous tests that have been offered of late. Bruck states that since the discovery of the complement-fixation test for syphilis by Wassermann, Neisser and himself in 1906 he has been trying to find a simple chemical reaction that would take the place of the complicated technic of the Wassermann reaction. This method, as he has published it, was worked out and is being used at the front, in the present war, where complete laboratory equipment is not available.

Commencing our experiments with a great deal of skepticism, we were much surprised at the results obtained, which are given below. Whatever may be the final status of the test in the determination of syphilis, we feel that there is a great deal of interest in the fact that this simple chemical reaction does pick our certain differences in the composition of blood sera, and that apparently a large number of syphilitic sera differ in their chemical composition percentage from the majority of non-syphilitic sera.

The technic, while exceedingly simple, offers many chances for errors and individual variations, so that we have thought it well to give directions and cautions at some length.

Bruck's [2] technic is described as follows: —

The test is made with .5 cubic centimeter clear serum in a test tube, to which is added 2 cubic centimeters of distilled water, and the whole shaken. Then, with a precision pipette, .3 cubic centimeter of the acidum nitricum purum of the German pharmacopeia is added, and the whole

* Being Contribution of the Massachusetts Commission on Mental Diseases, No. 191 (1917.11). *Bibliographical Note.* — The previous contribution (1917.10) was by H. C. Solomon, entitled "The Behavior of the Wassermann Reaction in Cases receiving Mixed Treatment," published in Medicine and Surgery, May, 1917.

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thoroughly shaken and then set aside at room temperature for ten minutes. Then 16 cubic centimeters of distilled water at room temperature is added, and, closing the tube with the finger, it is shaken up and down three times carefully, not vigorously enough to make it foam. This is repeated ten minutes later, and the tube is then set aside for half an hour. By this time the precipitate is entirely dissolved in the tube with the normal serum, while the syphilitic serum shows a distinct, flocculent turbidity. In two or three hours, or better still, in twelve hours, the gelatinous and characteristic precipitate is piled up on the floor of the test tube.

The acid is prepared by diluting the Acidum nitricum of the U. S. P. (specific gravity 1.403) with distilled water until the hydrometer shows the specific gravity 1.149, which corresponds to the nitric acid of the German pharmacopeia; but since this requires a special hydrometer, a simpler method is to make a 25 per cent. solution of the Acidum nitricum, which will give about the proper specific gravity.

The serum is obtained by allowing 10 cubic centimeters of blood to stand at room temperature for an hour, and then centrifuging. Serum that has stood for some time may be used as well as the fresh, and even bloody serum does not seem to confuse the results to any great degree. The serum gives the same results with or without inactivation. Post-mortem blood gave results as constant as that obtained during life, in the few cases that we had in this series. But the reaction may be influenced markedly by the size of the test tubes. We have found that the 13 by 1.9 centimeters is the most favorable size.

When one first thinks of this test it appears very simple and probably somewhat crude as a chemical reaction, but there are certain precautions that must be observed, and several hundred normal and syphilitic sera should be tried before the investigator can feel that he has a refined routine technic. There is the personal equation which must be watched, for here is probably the greatest source of error, and readily explains why two different persons get widely varying results with the same sera if they have done only a few dozen tests. We must take it for granted that the reaction is a quantitative one, where some positive reactions may differ only slightly from the normal non-syphilitic, and, furthermore, any normal serum may be made to give a positive reaction, and almost any positive serum be made to give a negative, by improper manipulation at some point in the test. There are as many places for error to creep in as there

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are steps in the process. Bruck has omitted many details in his publication, which allow personal variations, and so we have tried to develop a routine process that will eliminate as many of these as possible.

We shall here attempt to explain the methods which we have found most satisfactory, and at the same time indicate the places where error is likely to occur. The .5 cubic centimeter of serum is added to 2 cubic centimeters of distilled water, and shaken thoroughly. Now add slowly exactly .3 cubic centimeter of acid from a precision pipette, care being taken that it does not flow down the side of the tube. The tube should be shaken gently while the acid is being added, for this prevents the formation of a flocculent precipitate in normal serum which is difficult to dissolve later. After the acid is added shake each tube gently to make sure that these flakes do not persist. It is difficult to shake each tube in exactly the same manner, as must be done if we expect uniform results.

The first 250 tests of this series were made by allowing the tubes to stand for ten minutes as Bruck advocates. Then we found that practically all sera gave a positive reaction if allowed to stand fifteen to twenty minutes, and so in the other tests of the series an attempt was made to make the reaction more sensitive by allowing the tubes to stand only six to seven minutes. During this time the tubes should be shaken gently once or twice. The manner in which the 16 cubic centimeters of water is added also influences the reaction. If allowed to flow freely in upon the precipitate, the positive may be forced into solution as well as the negative. Both pipette and tube should be slanted and the water allowed to flow down the side of the tube without disturbing the precipitate. If all has gone well up to this point, we may see a marked difference between the normal and syphilitic precipitates, in that the normal will begin to go into solution at once, thus clouding the water, while a positive precipitate will be composed of large flakes which show little or no tendency to go into solution or cloud the water above. It must be remembered that the most flocculent positive precipitate will go into solution if the fluid is splashed or shaken too hard while the tube is being inverted. If any doubt as to the character of the precipitate now exists, it may be allowed to stand ten minutes longer, and again inverted as before, or even repeated several times during the next hour or two. We see no reason why the tubes should be left to stand over night, for

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during this time a precipitate usually settles in the normal tubes. This, however, differs from the syphilitic precipitate in that it is still finely granular, and goes back into solution readily when the tubes are inverted.

In view of these possible grounds for error, it is only logical to run controls of known positive and known negative sera along with each group of unknown bloods, and even then certain tubes will seem doubtful, in which event the test should be repeated with added precaution, to see if a definite positive or negative reaction may be obtained.

In the last tests of this series we seemed to aid the reaction by rendering the sérum-water solution alkaline by one or two drops of 10 per cent. potassium hydroxide before the acid was added.

The positive sera have a larger precipitate, while the normal seem to dissolve more readily.

TABLE I. — *Syphilis: Nervous System involved.*

General paresis:	
Wassermann and Bruck agree positively,	47
Wassermann and Bruck agree negatively,	7
Wassermann and Bruck at variance,	10
Tabes dorsalis:	
Wassermann and Bruck agree positively,	3
Cerebrospinal:	
Wassermann and Bruck agree positively,	8
Wassermann and Bruck agree negatively,	3
Juvenile paresis:	
Wassermann and Bruck agree positively,	1
Summary:	
Wassermann and Bruck agree positively,	59
Wassermann and Bruck agree negatively,	10
Wassermann and Bruck at variance,	10

TABLE II. — *Syphilis: Nervous System not involved.*

Syphilis:	
Wassermann and Bruck agree positively,	12
Wassermann and Bruck at variance,	5
Congenital Syphilis:	
Wassermann and Bruck agree positively,	3
Wassermann and Bruck agree negatively,	2
Summary:	
Wassermann and Bruck agree positively,	15
Wassermann and Bruck agree negatively,	2
Wassermann and Bruck at variance,	5

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TABLE III. — *Non-Syphilitic: Wassermann Reaction Negative.*

Doubtful or positive Bruck,	86
Bruck test negative,	216

Total for Three Groups.

Wassermann and Bruck agree positively,	74
Wassermann and Bruck agree negatively,	230
Wassermann and Bruck at variance,	101

The tests here reported were made on blood sera obtained from patients admitted to the Psychopathic Hospital and its out-patient department. As a routine Wassermann test is made on each patient who enters the hospital, it was only necessary to take another tube of blood from each patient, and the results checked in each instance with the Wassermann reaction. As it takes several days to get the report from the Wassermann Laboratory of the State Department of Health, there was no chance of being prejudiced by a previous knowledge of the Wassermann reaction. The cases for the most part were those of mental disease, the majority in good general physical health.

A comparison of the total number with the Wassermann reaction shows that there was a general agreement of 304 of the 405 cases tested, or a percentage agreement of practically 75 per cent. In considering the cases of syphilis of the central nervous system in a group by themselves we find that the agreement is closer, since 69 of the 79 cases tested, or 87 per cent., agreed without any question of doubt. It will be noted that in several cases of general paresis the Wassermann reaction, which was repeated at intervals, was negative, and in most of these cases the Bruck test was negative also. Our few cases of congenital and latent syphilis also checked very closely with the Wassermann test. In the various groups of mental cases in this series no factor of interference was discovered. It is also of interest that in the cases where the blood was obtained post mortem, the Bruck test agreed with the Wassermann result obtained on ante-mortem blood serum. Further work on post-mortem sera will be reported. Some of the patients not included in the syphilitic groups, who have a negative Wassermann and no clinical signs of syphilis, give a history of previous infection at some time, which might partly account for the variations in the two tests.

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Conclusions.

1. We present results of the Bruck serochemical test in 405 cases. In 101 of these cases there were definite clinical manifestations of syphilis, in which the Wassermann and Bruck tests agreed positively in 74, or 75 per cent. The two tests agreed negatively in 12 instances, and were at variance in 15.

2. In the group which showed syphilis of the nervous system we had 64 cases of clinically certain general paresis, of which the Wassermann and Bruck tests agreed in 54 instances, or practically 85 per cent. In other forms of central nervous system involvement the agreement was 100 per cent. in the 15 cases tested.

3. In the cases with no apparent involvement of the nervous system the agreement was somewhat less, being 76 per cent. This may be in keeping with the fact that the Wassermann test was not so strongly positive in these cases.

4. The advantages of the test are: (1) the short time required to do the test, (2) the limited amount of apparatus necessary, and (3) the simplicity of the technic.

5. The disadvantages of the test seem, for the most part, to be bound up in the personal variations that are apt to occur.

6. We are here dealing, most probably, with a quantitative chemical difference in the protein content of syphilitic and non-syphilitic sera, the nature of which is not understood by us. It is our hope that this may be brought to light in the near future in the field of chemistry.

REFERENCES.

1. Bruck: Münchener medizinische Wochenschrift, Munich, Jan. 2, 1917, Vol. LXIV, No. 1, p. 25.

2. Bruck: Journal of American Medical Association, March 24, 1917, Vol. LVIII, No. 12, p. 944.

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PLATE 1.

The apparatus necessary for the test.

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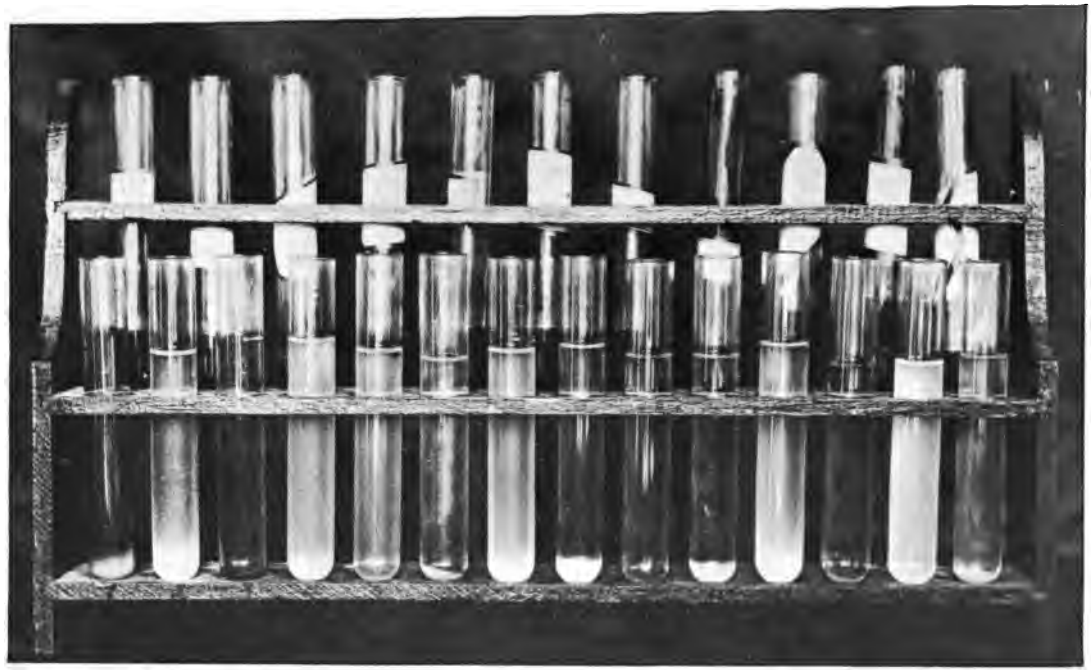
PLATE 2.



(Read from left to right).

Tubes 1, 8 and 10 show strongly positive precipitates with clear fluid above.
Tubes 2 and 4 strongly positive reactions where tubes were inverted immediately before taking picture.
Tubes 3, 9, 12 and 14 show negative sera in clear solution.
Tubes 5 and 13 show negative sera in cloudy solution.
Tubes 6 and 14 show precipitate that may occur in negative sera if allowed to stand over night.
Tubes 7 and 11 show positive sera with clouding above the precipitate.

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THE PSYCHOPATHIC EMPLOYEE: A PROBLEM OF INDUSTRY.*

By Mary C. Jarrett of Boston,

chief of social service, boston psychopathic hospital.

The most striking feature of the problem of the psychopathic employee is the general ignorance of its existence. When an effort was being made by the social service of the Psychopathic Hospital to secure private support for a study of this subject, some fifteen employers who were visited almost without exception stated confidently that they had no such persons as our patients in their employ. While they expressed interest in the project as a good cause in helping such unfortunate persons to be self-supporting, they could not see that the subject had anything to do with their business. If a person suffered from mental disease he seemed to them an object of benevolence. One employer who was interested enough to make a contribution of money begged that his firm should not be asked to employ our patients. Shortly after, the employment manager of this firm hired a man who was described to him as having had an attack of confusion and excitement, during which he prayed aloud on the street, and was brought to our hospital where his mind had become entirely clear. He was engaged to do work for which he had references of proficiency. This incident is a crude sketch of the present situation, the employment managers and foremen adapting themselves in a rough and ready fashion to conditions as they find them, and attributing symptoms of mental disorder to "a difference of temperament," as one foreman put it, while the members of the firm and the executive force are unaware that there is any mental disease in the shop.

The literature of the subject of nervous and mental disease in industry has been almost entirely on occupational neuroses, — conditions that have been defined as "disturbance of innervation of the muscles, occurring only in certain complicated

* Being Contributions of the Massachusetts Commission on Mental Diseases, whole number 194 (1917.14); the previous contribution, No. 193 (1917.13), was by E. E. Southard, M.D., entitled "Zones of Community Effort in Mental Hygiene," to appear in Transactions of the National Conference of Charities and Corrections, 1917. Reprint from Medicine and Surgery, September 1917.

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movements acquired by practice, of such a nature as to permit the same muscles to respond to the will in all other actions."* Very few references can be found on the subject of abnormal nervous and mental conditions that are not directly the result of industrial conditions. In the most complete bibliography of industrial hygiene available, covering 49 pages,† there are many references to occupation neuroses, but only four that deal with other psychopathic conditions.

Lately there are signs that the subject of mental hygiene in relation to industry is beginning to receive widespread attention. Psychological tests for general intelligence and special abilities have been in use for a number of years, but the subject of abnormal reactions — temperamental difficulties and anti-social behavior — has not yet been investigated in this connection to any extent. Indications are numerous that it is about to be studied from several points of view. Dr. Irving Fisher, in an address before the National Conference of Social Work this year, said, "A new and very important field of industrial hygiene is just now being pointed out in what may be termed industrial psychiatry." In an article called "Efficiency and Inefficiency — A Problem in Medicine," which appeared in "Mental Hygiene," April, 1917, Dr. Pearce Bailey says, "Physical disease offers fewer obstacles to a national efficiency than do defects or disorders of mentality." He regards the proper adaptation of the individual to his employment as "a branch of public health," and says, "It is for medicine to show that efficiency in human affairs, just as surely as in industry, depends on developing and improving the material; and that a primary condition of this is to know what the material is." From the standpoint of industry the subject is beginning to receive recognition. "The greatest business problem to-day is the human problem of labor, and the wise handling of men. Here lies the greatest opportunity, and also the greatest danger, confronting modern business," was said by Ernest Fox Nichols in an address on "The Employment Manager," before the United States Chamber of Commerce in 1916. In the final report of the Commission on Industrial Relations, under "causes of unemployment," among "conditions determining the worker's ability to grasp or re-

* Occupation Neuroses, by E. E. Southard and H. C. Solomon, in "Diseases of Occupation and Vocational Hygiene," edited by George M. Kober, M.D., and William C. Hanson, M.D., Philadelphia, Blakiston & Co., 1916.

† Bibliography on Industrial Hygiene, American Labor Legislation Review, Vol. II, No. 2, June, 1912.

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tain the opportunity to be employed which industry offers," are cited "those personal factors, such as dishonesty, laziness, intemperance, irregularity, shiftlessness and stupidity which are commonly included under the term 'deficiencies of character.'" That these characteristics are to a considerable extent symptoms of mental defect and mental disorder cannot be doubted.

Among the reasons for discharge that appear on the record cards of one firm in Boston are the following: causing trouble about the work; not steady; incompetent; tardiness; slackness; poor attendance and indolence; drinking to excess; fainting spells; troublesome; not wholly reliable as a man, but a good fireman; constant disagreement with foreman; quarrelsome; assault. A conference with several of the foremen of this firm recently brought out the pains that they take to deal with the peculiarities of the employees under them. The superintendent asked one of the foremen if he would have had the patience to keep a certain quarrelsome man if he had not known that he was a patient from the Psychopathic Hospital. He replied, "My patience works the other way. I want to give every man a chance. And he does his work all right." This man had just received a raise in pay. He is a case of general paresis, a man who had been a street car conductor. His foreman said that he and the other men in the shop explained the patient's peculiarities on the supposition that he took "dope," because on some days he was more excitable than at other times. Another employee was described as having "a temper like a meat-axe, but when he's calm he's one of the best workers I've got. I never saw a fellow get as angry as he does — you couldn't hold him with a chain." These two instances illustrate the adjustment the foreman may be able to make without special instruction, but another case that was told indicates the possibility of failure. This man also did his work well, but "he thought everybody was talking about him, and we were afraid we wouldn't get rid of him before he had done some harm." One wonders what happened in the next shop where he worked.

The Pyschopathic Hospital has been able through private contributions to carry on an investigation of the difficulties of our patients in industry, and how far these difficulties are referable to their mental disorder. The services of one social worker have been available over a period of two years. The subject is immensely complicated, but our hope has been to lay the foundation of an attempt to simplify its outlines so that the main facts

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will stand out. We regard our efforts as a very small beginning with an immense outlook. To quote from an unpublished statement by Dr. Herman M. Adler, formerly chief of staff at the Psychopathic Hospital, and a member of the committee of employment and after-care under the auspices of which the work was begun, "The contribution that we are trying to make is a better understanding of the difficulties of personality that underlie some of the labor troubles; and the reason for conducting this inquiry at the Psychopathic Hospital is that here we have at hand a large number of individuals who have experienced vocational difficulties and who, on account of their temporary residence at the hospital, have been studied carefully from the medical and psychiatric side. We feel that if the vocational difficulties of such persons are studied, the knowledge thus gained, when properly correlated with the results of the medical and psychiatric examinations, will give an insight into the same conditions when they occur in individuals who have deviated less markedly from the normal."

The work carried on has been in two parts, — intensive social care in a small number of cases, and investigation of industrial histories in a larger number. The group chosen for study was men between the ages of twenty-five and fifty-five, who had not been industrially disabled up to the time of the illness that brought them to the hospital. The industrial history has been obtained from both patient and employer. A tentative report of the first hundred cases studied was written by Dr. Adler, and published in the first number of "Mental Hygiene," January, 1917. The suggestion in Dr. Adler's report is that there are two types of individuals that experience difficulties in employment.

One type, which is grouped under the headings of inadequate and paranoid, is afflicted with certain characteristics of personality which are not amenable to treatment. To maintain these people in the community it is necessary to modify the environment so far as possible in order to prevent, in the first place, the calling out of their peculiar reactions, and, furthermore, to prevent their suffering the results of their acts; in other words, to keep a man "on the job" in spite of his unpopularity or inadequacy. The other type, grouped under the heading of "emotionally unstable," suffers from the results of temperament. These individuals are subject to variations of temperament, and the treatment of their unemployment must be guided by a knowledge of their tendencies so

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that environment on the one hand can be suitably influenced or chosen for them, and the individuals themselves may be trained to counteract their impulses to some extent.

The other section of the work, confined to a small group of patients, has been an effort to adjust the patient to his occupation, — to find him suitable employment and to keep him employed. He has received continuous social supervision as well as medical care. The number of cases so dealt with is too small to warrant any conclusions based upon statistical data, but the results in individual cases suggest possibilities of interest.

The men in this group were selected because of difficulties connected with employment. The unemployable were excluded, being cared for by another division of the social service. The men under consideration are industrially competent. We have an understanding with their employers that they are to be discharged if they do not earn their pay. Among the occupations they represent are machinist, teamster, porter, tailor, stenographer, traveling salesman, clerk, electrotyper, elevator operator, chemist, steam fitter. Their psychiatric diagnosis include psychopathic personality, psychoneurosis, alcoholic psychosis, manic-depressive insanity — depressed, dementia præcox, traumatic neurosis, general paresis.

The social condition of this group of patients may be roughly indicated by a tabulation of social symptoms in the fifteen cases under active supervision at the present time, which are as follows in the order of frequency: financial difficulties (such as debts, dependence on relatives, no income), 14; unemployment (at the time referred), 11; inebriety, 10; irregular employment, 9; marital discord, 9; jealous suspicions, 4; arrest (for inebriety or non-support), 4; suicidal attempt, 3; assault, 2; industrial accident, 2; stealing, 1.

The cases outlined in the charts that accompany this article may be cited in concrete illustration of what has been done in the way of adjustment of these psychopathic individuals to their employment. The charts were prepared as part of an exhibit intended to give a quick view of results of social work in certain psychopathic cases.

Case I. — When this patient was thirty-one years old he left home and was not heard from for seven years. He traveled over the country on foot and in freight cars, occasionally working in railroad construction gangs. He returned to Boston and worked at automobile repairing,

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having six jobs in nine years. Before coming to the hospital he had been out of work some months, and he did not work during a period of eleven months that elapsed before he was a second time admitted to the hospital. He then came under the care of the social service. The diagnosis at this time was dementia præcox.

At the time of his first admission he had been drinking heavily, had ideas of reference and delusions of persecution, and had made several attempts at suicide. He was discharged as "entirely clear" and with "good insight." Eleven months later he was readmitted disturbed and deluded, and remained four months. On discharge he went to work in an automobile repair shop, where his employer said he was a good, handy man, though he worked slowly, and got nervous and tired if hurried. He was laid off when work was slack, but readily got another position where he earned $18 a week, and was said to be very steady and reliable, and an excellent workman. When laid off for slack work after eleven months he was recommended by his employer to another job.

The patient has lived with his sister who, instructed to indulge his eccentricities and not to irritate him, manages him very intelligently. He attends the weekly meetings of the Men's Club at the hospital regularly. He will not let his sister come to the Women's Club, for although he is very fond of her, he is annoyed if she has anything to do with his hospital business. He never goes out in the evening except to the hospital. He has not taken any alcohol since the first admission, two and a half years ago, and since the second discharge has been well and cheerful. He says he has at times "a slumped feeling," when he thinks, "What's the use," but he has worked steadily, and lived without social disorder, for the last year and six months.

Case II. — A tailor who attempted suicide during a period of slack work when he was in debt. He has an excellent wife and one son. His wife had lost all affection for the patient because of his habits of drinking to excess and gambling, and was planning a suit for divorce. He was irritable and disagreeable to his family, accusing his wife of immorality, and calling her insulting names; but he had spells of being agreeable and affectionate. His wife had become exasperated, and continually scolded him, which he protested he could not endure any longer.

He had worked for one firm for three years, making $18 and $20 a week, but when he was laid off in the dull season was unable to get other work, and became despondent. He was said to be a good workman, but contentious and annoying. His employer did not want him back because he "made too much trouble." Another employer said, "I cannot say a good word for him. He finds fault if asked to do a piece of work over again, and he is always making trouble by talking unionism." The diagnosis was alcoholism plus simple depression. In the last two and a half years, since he was in the hospital, the patient has worked in a number of tailor shops, doing factory work of different kinds in the dull seasons. He has supported his family, has given up gambling and bad associations,

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and has had only three or four short spells of drinking. When he is working he does not drink at all, and never as much as previously. His wife's attitude toward him has been changed, and although she says she has no love for him, she is careful to make their home as attractive as possible, and to arrange for recreation for him in her company.

CASE III. — A Russian Jew, forty-one years old. Diagnosis, neurasthenia. This patient had been in Boston seven years working as a clothes presser, earning $25 a week, from which he supported his family in Russia, — his wife, six daughters and his wife's parents. He had been obliged to stop work seven weeks before he came to our out-patient department because of pains in his legs so severe that he was unable to exert the necessary pressure for operating his pressing iron. He had lived an exemplary life, denied himself to send money to his family, and finally had become hopeless of ever bringing them to America, or of earning a living if he returned to them. He is a man of some education, and had been in business for himself in Russia. It was decided that the best prospect of making the patient self-supporting lay in setting him up in business in a small store, and a sum of money was raised for this purpose. After many attempts to find a store that would be a safe investment, an opportunity for trading in coal was arranged. Meanwhile a number of temporary occupations were tried, which the patient would give up after a brief effort. He was under treatment as an out patient continuously, and for six weeks was in the house as a voluntary patient. He complained that the doctors did not help him; thought that the lodge members who were obtaining financial support for him were adding to their reputation as charitable individuals by helping him; claimed that the money raised for him belonged to him, and should be given to him unconditionally; repeatedly said he suffered "every minute of the day," but had not the courage to kill himself, though he would if it were not for his children. As the pains in the legs decreased and he admitted feeling better, we insisted that he take a position as porter in a small factory in order to prevent his becoming completely disused to work. This was a job that he considered beneath him, and paid only $10 a week, but it was the only thing open that he could do. He still holds on to this job, although he has since developed the coal business. In the factory he is regarded as a man who must be humored, for everybody near him must hold his opinion or none. The foreman sums him up, "Well you know *he's* Simonson!" He has been elected president of a benefit organization to which he belongs. He is said to be "as cranky as ever," but alert and in good spirits.

CASE IV. — An American, thirty-five years old, single. Diagnosis, alcoholic psychosis. Sent from a general hospital where he had gone for an operation for an ulcer on his foot, with the statement that he had become "deluded and violent." He had ideas of reference and delusions of persecution. For a year previous he had been out of work. According to his family there had been a change in him recently; he used to

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want to work, but now seemed not to care about anything. He had always been rather timid and good-natured, but eccentric. He had been a steady drinker for twenty years. For ten years he had worked as packer in a shipping department, where he was kept "mostly out of pity, as he seemed in such poor health." He secured a similar position elsewhere at a slight increase in wages, and after two years was transferred to the elevator, as he was too slow, and finally discharged as not strong enough for the work.

After leaving the hospital he had several temporary jobs before a permanent position was found for him as elevator operator in a large department store. Meanwhile he had received medical attention from a general dispensary, and financial assistance from a social agency. He worked steadily, paid back all the money loaned him and abstained entirely from alcohol. When the elevator operators went out on strike he went with them, because, he said, he was "afraid they'd do him harm" if he did not join them; but the superintendent said if the firm allowed any of the men to come back the patient was the first one he would want — that he was one of his best operators, and no man showed "a better disposition to do his work well." He was shortly taken back on his job.

The patient lived near his married sister, and spent a good deal of time with her family until they moved south. She and her husband had a sympathetic and intelligent attitude toward him. His landlady now takes a kindly interest in him, and says that he is "always quiet and nice." The patient is well and says, "I am still on the right road and hope I can continue so for good."

Case V. — This patient, a teamster, aged thirty-two, was admitted as a voluntary patient on advice of a physician in the out-patient department, where he had come complaining of headaches, and hearing voices telling him that his wife was immoral. For a year he had suffered from severe headaches at work, and had become increasingly jealous of his wife, until within the last month he had had spells of weeping because he thought she was going to leave him, and had twice attacked and choked her. About a week before, he had been obliged to stop work. His wife is an intelligent, capable woman of good habits. There are three children. The patient was in the habit of drinking to the extent of becoming intoxicated occasionally. The diagnosis made was alcoholic delusional insanity in a high-grade moron.

The patient returned to the same job he had held for ten years. His employer says he works well, does not drink and seems to be happy. He has, however, had three attacks of drinking out of work hours, each lasting a month, during which he has been jealous and abusive. When not under the influence of alcohol he is kind to his family. He and his wife attend the Men's Club at the hospital. He has supported his family, and has had a raise in wages.

Case VI. — An Irish American, forty-five years old, married, with one child. Diagnosis, general paresis. This man had been obliged to give

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up his work in a machine shop because he had become tremulous and easily confused, and had several times fallen unconscious. He came to the out-patient department with his wife in extremity. They had no money but return car fare, and had no means of income. Two years before, the patient had been brought to the hospital by the police, who found him in a convulsion on the street. He had refused to return for treatment. He had always been a hard drinker, and continued to drink. In the two years he had had three jobs, leaving because he found each one too hard. He found work with a manufacturing firm that had previously employed him, and that allowed him two mornings off to come for treatments, and to make the time up at night, so that he got full pay, $12. He stopped drinking, and his wife, who had been completely out of patience with him, became reconciled. She says it was the best day of her life when she came with the patient to our out-patient department, and that they are "like sweethearts again." Work was obtained for the wife until the debts are paid off. She is also under treatment. The patient has lately had a raise of pay.

These cases are typical of a considerable group of men who pass through the Psychopathic Hospital, with the common factor of difficulty in employment. They are either disabled for work, on the way to industrial disability, have trouble in holding a job, or are about to be discharged because the firm is afraid of their psychopathic tendencies. With only one social worker available for the purpose, it is possible for us to assist only a small number to adjust themselves, or to study more than this small group after they leave the hospital. Although the numbers we have been able to deal with in this intensive fashion are too small for generalization, there are some evident conclusions that stand out in our experience. In most of these cases inebriety is a prominent factor, since the habit of alcoholism is an easy channel for these unstable temperaments. Alcoholism in these cases may be regarded as one of the symptoms of a psychopathic constitution. Its effect in turn is to exaggerate the original defect. Withdrawal of alcohol increases the patient's chances of social adjustment, but alcohol is by no means the only stumbling block. Family discord is a large factor both as cause and effect, and in treatment the co-operation and intelligent understanding of the family are essential. Economically it is a distinct gain if a psychopathic patient who was in process of industrial decline can be self-supporting and competent for the greater part of the time, even if he has an occasional attack. One of our patients employed as an expert chemist was about to be discharged three

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and a half years ago as hopeless after an alcoholic attack of psychopathic nature; but when the man's condition was explained to the firm they gladly retained him, saying that they could afford to allow him occasional leave of absence, if necessary, for the special value of his work. He was in the hospital once again six months later, but for the last three years has worked steadily. This case illustrates both the economic value to society of keeping competent but psychopathic individuals employed, and also the possible value to industry. A firm that discharged one of their best salesmen after an attack of manic-depressive insanity lost an asset. The patient has not had another attack since, now four years, and has been competent in every way. He was safer for the firm than ever before in the six years they had employed him, for, instructed in the nature of his disease, they could have gotten him to the hospital at the earliest signs of an attack, and by early treatment possibly could have decreased the duration of the attack. In general, we find employers quite willing to employ patients whose mental condition and industrial efficiency are frankly described, and to retain them as long as they are able to do the work. Understood by their employers, and taught to understand themselves, psychopathic individuals who would otherwise be thrown out of industry may keep their places as efficient employees.

Dr. Southard, director of the Boston Psychopathic Hospital, thinks that before long there will be a branch of psychiatry known as social psychiatry, exactly as definite in its way as social psychology. An important division of social psychiatry would be the application of psychiatric knowledge to industrial problems.

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CASE I

DEMENTIA PRÆCOX

IN A MACHINIST

JANUARY, 1916	JANUARY, 1917
INDUSTRIAL DISABILITY	GOOD HEALTH
UNEMPLOYMENT	REGULAR WORK
DEBTS	OUT OF DEBT
SUICIDAL ATTEMPTS	CHEERFUL

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CASE II

ALCOHOLISM; DEPRESSION

IN A TAILOR, 37

NOVEMBER, 1914	NOVEMBER, 1916
UNEMPLOYMENT	EMPLOYMENT
GAMBLING INEBRIETY CONTENTIOUSNESS	WIFE NOW MANAGES
DEBTS	OUT OF DEBT
FAMILY DISCORD	NO LOVE LOST; TOLERANCE
SUICIDAL ATTEMPT	CHEERFUL

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CASE III

NEURASTHENIA

IN A CLOTHES PRESSER, 41

1914	1916
UNABLE TO WORK	AT WORK
SUPPORTED BY CHARITY	SET UP IN BUSINESS
(PHILANTHROPY!)	(SOCIAL SERVICE!)
FAMILY WITHOUT SUPPORT	FAMILY SUPPORTED
SUICIDAL IDEAS	CHEERFUL

(FAMILY IN RUSSIA)

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CASE IV

ALCOHOLIC PSYCHOSIS

IN A PACKER

NOVEMBER, 1915	NOVEMBER, 1916
INEBRIETY	SOBRIETY
UNEMPLOYMENT	STEADY WORK
PHYSICALLY DISABLED	GOOD HEALTH
NO INCOME	GOOD WAGES

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CASE V

ALCOHOLIC JEALOUSY

IN A TEAMSTER

JANUARY, 1916	JANUARY, 1917
INEBRIETY	SOBRIETY
INADEQUATE INCOME	INCREASED WAGES
SUSPICIONS OF WIFE	SUSPICIONS GONE
ABUSE OF WIFE	ABUSE OVER

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CASE VI

GENERAL PARESIS

IN A MACHINIST

OCTOBER, 1915	JANUARY, 1916
DISABLED FOR WORK	EMPLOYED
INEBRIETY	SOBRIETY
MARITAL DISCORD	HAPPINESS
NO INCOME	ADEQUATE WAGES
DEBTS	DEBTS REDUCED
NO MONEY FOR THERAPY	TREATMENT

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ON THE USE OF THE EMANUEL-CUTTING MASTICHÉ TEST IN EXAMINING SPINAL FLUID FROM PSYCHOPATHIC SUBJECTS.*

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In 1915 one of us, Lowrey,[1] investigated the Emanuel mastiche test on the spinal fluid of the insane. At that time the conclusion was drawn that the test was not a valuable addition to our diagnostic armamentarium. This conclusion seemed justified by the fact that there was difficulty in determining what was a positive reaction, and the positive reactions did not check with other tests in the spinal fluid. Recently Cutting[2] has published an article in which he proposes a slight modification of the original Emanuel test, and states as a result of his examination of two hundred spinal fluids that the test is of considerable value in the diagnosis of syphilis of the nervous system. His table shows no cases diagnosed as paresis, cerebrospinal syphilis or tabes giving a negative mastiche, although fourteen of this general group gave a negative Wassermann. Further, he has no non-syphilitic cases with negative Wassermann tests which gave a positive mastiche.

Accordingly, it seemed to us desirable to reinvestigate the test according to the modification proposed by Cutting. His method is as follows: —

A stock mastic solution is made by dissolving 10 grams of gum mastic in 100 cubic centimeters of absolute alcohol, and then filtering. This stock solution keeps indefinitely if well corked. To 2 cubic centimeters of this solution 18 cubic centimeters of absolute alcohol are added, and insufflated rapidly into 80 cubic centimeters of distilled water. This makes an emulsion of mastic which is opalescent when held to the light. This solution can be used immediately or after several days; indeed, the reactions seem to be more easily read when a solution is employed which has stood for at least a few hours.

* Contribution of the Massachusetts Commission on Mental Diseases, No. 195 (1917.15).

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Next, a 1.25 per cent. sodium chloride solution is made with distilled water, and to each 99 cubic centimeters of this salt solution is added 1 cubic centimeter of a .5 per cent. solution of potassium carbonate made up with distilled water.

Then six small test tubes are placed in a rack. These tubes should have been washed thoroughly in tap water, then in denatured alcohol, to remove any old mastic adhering to the sides of the tubes, rinsed in distilled water and dried conveniently in a hot-air oven. To the first tube 1.5 cubic centimeters of the combined salt and potassium carbonate solutions are added, and to the other 1 cubic centimeter each. Then .5 cubic centimeter of spinal fluid is added to the first, and after thorough mixing 1 cubic centimeter is transferred from the first to the second, 1 cubic centimeter from the second to the third, and so on, the last cubic centimeter that remains over from the next to the last tube being thrown out, and no spinal fluid being put in the control. Now to each tube 1 cubic centimeter of the mastic solution is added and stirred thoroughly with a glass rod, care being taken to wash the rod with distilled water before going to the next series. It is best to finish each group before beginning another.

The racks are set away, and in from twelve to twenty-four hours the end-results can be read. If the racks are placed in an incubator at 37.5 centimeters, the precipitation is complete in from six to twelve hours.

We have tested the fluids from 268 patients admitted to the Psychopathic Hospital. Of these, 74 fall into the general group of syphilis of the nervous system, the majority of the remainder being non-syphilitic psychopaths and non-psychopaths, with the addition of three cases of acute meningitis. The results are presented in tabular form in Table No. 1.

TABLE I. — *Result of the Mastiche Test in 268 Spinal Fluids.*

CLASSIFICATION.	Number.	Wassermann Reaction, Blood.	Gold.	Mastic.
Paresis,	54	+	+	+
Paresis,	13	−	+	+
Neurosyphilis,	6	+	+	+
Tabes,	1	+	+	+
No psychosis,	9	−	−	−
Dementia præcox,	34	−	−	−
Dementia præcox,	1	+	−	−
Manic-depressive psychosis,	23	−	−	−

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TABLE I. — *Result of the Mastiche Test in 268 Spinal Fluids* — Concluded.

CLASSIFICATION.	Number.	Wassermann Reaction, Blood.	Gold.	Mastic.
Manic-depressive psychosis,	1	+	−	−
Manic-depressive psychosis,	4	−	+	−
Paranoia,	9	−	−	−
Unclassified,	20	−	−	−
Unclassified,	1	−	+	−
Unclassified,	1	+	−	−
Arteriosclerotic,	6	−	−	−
Arteriosclerotic,	2	−	+	−
Feeble-minded,	26	−	−	−
Feeble-minded,	1	+	−	−
Feeble-minded,	2	−	+	−
Epilepsy,	11	−	−	−
Traumatic,	2	−	−	−
Meningitis,	3	−	+	+
Alcoholic psychosis,	10	−	−	−
Chronic alcoholic,	9	−	−	−
Chronic alcoholic,	1	+	−	−
Psychopathic personality,	16	−	−	−
Chorea,	1	−	−	−
Toxic psychosis,	1	−	−	−

In all of our cases the following tests were made: Wassermann test in blood and spinal fluid; albumen, globulin, cell count and colloidal gold tests in spinal fluid.

We have recorded all tests as + or — in the table, and have compared only the Wassermann and gold reactions. While a more elaborate analysis is possible, it seems unnecessary for the purposes of this paper.

A normal fluid causes no change in the mastiche test solution in any tube. The control tube does not precipitate, as was the case using the original method. Between the unchanged and the maximum change, *i.e.*, complete precipitation with clear supernatant fluid, we may recognize certain gradations. Thus in many cases there is produced a very marked clouding, through which light is not transmitted. In another type light is very faintly transmitted. Again, there may be a perceptible cloud-

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ing with fairly good transmission of light. Finally, there may be a change so faint that it is recognizable only on comparison with the control. These changes can be noted by the number system, as in reading the gold reaction. We then have a series ranging from 5 to 0, and can compare mastiche and gold curves, if such exist.

Because of certain technical facts our comparisons cannot always be exact, hence no general table of comparisons is introduced, but instead we shall compare certain types of reaction with one another.

We have regarded as positive all cases showing marked clouding in two or more tubes. Some of our fluids tested fresh have shown precipitation, and after some stay in the ice box have shown only clouding.

An examination of our material shows that 48 of the positive cases showed precipitation. Practically all fresh fluids giving a strong paretic curve with the gold showed precipitation with mastiche.

As types we may quote the following: —

Gold.										Mastiche.					
5	5	5	5	5	4	3	0	0	0	5	5	5	4	4	0
5	5	5	5	4	3	2	0	0	0	5	5	4	3	2	0
5	5	5	4	3	2	1	0	0	0	4	4	3	0	0	0

Cases of vascular neurosyphilis have given us weaker reactions with mastiche: —

Gold.										Mastiche.					
3	3	2	1	0	0	0	0	0	0	3	3	2	1	0	0
3	3	2	2	1	0	0	0	0	0	3	3	2	1	0	0
3	4	3	1	0	0	0	0	0	0	2	2	1	1	0	0

This is also true of the treated cases; where the gold reaction has become weaker the mastiche reaction is also weaker.

Thus in one case the gold had come down to 0 0 1 2 2 2 2 1 1 0; mastiche, 3 3 2 1 0. In one treated case ventricular fluid gave a negative gold and a weakly positive mastiche reaction.

We had three cases of acute non-syphilitic meningitis. In these cases neither the gold nor the mastiche reaction are of differential value. Of these the following is a type: albumen, + + +; globulin, + + +; cells, 2,000; gold, 3 3 4 3 4 4 3 5 2 2; mastiche, 4 4 4 3 3 0 —.

It is well known by those who use the gold test that there is a fairly marked variation in reagent sensibility. Lowrey [3] has

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called special attention to this point. Care and experience are required in making the reagent and *interpreting* the results. The mastiche reagent is simple and the interpretation is easy. Furthermore, it seems to be very accurate. Of a number of cases showing a positive gold (other tests negative), the following will serve as a type: —

On the first examination all tests were negative except the gold, which read: 5 4 3 3 3 0 0 0 0 0. The mastiche was negative. On second testing the gold (new reagent) was negative.

Because of these facts it seems to us that the mastiche test as modified by Cutting has a distinct place in the clinical laboratory. Because of the ease and accuracy of examination it may well be used to determine in which cases the more complicated gold test should be made.

Our experience indicates that the test does not differentiate between lues and acute meningitis; hence the chances are that the reactions in tubercular meningitis and tumors will not be differential.

We feel that the facts presented in this paper demonstrate the accuracy and value of the mastiche test, and justify the conclusion that it has a place in the examination of spinal fluids, especially where, as is the case in this hospital, large numbers of spinal fluids are examined (about 40 a week). In all cases showing clouding with mastiche, a gold reaction should be performed as a final check.

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1. Lowrey, Lawson G.: Two New Cerebro-spinal Fluid Tests. Boston Medical and Surgical Journal, Vol. 177, 1917.

2. Cutting, James A.: A New Mastic Test for the Spinal Fluid. Journal of American Medical Association, Vol. 68, p. 1810, 1917.

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ADMINISTRATION.

A committee was appointed by the Commission to prepare uniform rules and regulations for the State institutions under supervision.

The members of this committee were the late Dr. Henry P. Frost, superintendent of the Boston State Hospital, as chairman; Dr. H. O. Spalding, superintendent of the Westborough State Hospital; and Dr. John B. Macdonald, superintendent of the Danvers State Hospital.

Their report was accepted by the Commission, and is herewith presented.

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RULES AND REGULATIONS.

Officers and Heads of Departments.

Assistant Physicians.

1. The assistant physicians shall be medical graduates of thorough education, experience and good standing.

They shall act as the immediate medical attendants upon the patients, in the several departments respectively assigned them by the superintendent.

2. They shall attend to the prescription of medicines, and see that they are properly administered. Whenever it shall be necessary to administer food or medicine coercively it shall be their duty to superintend in administering the same.

They shall visit the wards in the morning and at evening of each day, except in a colony service, and carefully note the condition and treatment of patients, and in cases of severe illness they shall visit the wards as much oftener as may be necessary.

They shall look after the diet, the service of food, the bathing of patients, the cleanliness, warmth and ventilation of the wards, and report to the superintendent any defects or irregularities in the same.

3. They shall see that all the directions of the superintendent in relation to the care and treatment of the patients are faithfully and promptly executed, and shall forthwith report to the superintendent any cases of misconduct, neglect or abuse which fall under their notice, or with which they may be made acquainted.

They shall aid in devising amusement and employment for patients, and use their best endeavor to promote their comfort and hasten their recovery.

4. They shall, under the direction of the superintendent, aid in keeping the records, preparing statistics, conducting correspondence, attending to visitors, and shall perform such other duties as shall be assigned them by the superintendent.

5. These rules shall also apply to medical internes.

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Steward.

General Powers and Duties of the Steward. — The steward, under the direction of the superintendent, shall be accountable for the careful keeping and economical uses of all furniture, stores and other articles provided for the hospital, and under the direction of the superintendent —

1. Shall make all purchases for the hospital and cause to be carefully checked the delivery of all articles received.

2. Shall make and keep the inventories, and accounts of stock on hand and articles issued to the various departments, and make all estimates for maintenance supplies.

3. Shall, under the direction of the superintendent, have supervision of the storerooms and any other departments assigned to him by the superintendent, and shall have the direction of the employees in such departments.

4. Shall endeavor to secure faithful discharge of duty on the part of all employees, and report any dereliction of duty to the superintendent.

Treasurer.

1. The treasurer shall have charge of all financial accounts of the hospital, and shall receive and disburse all moneys involved in its transactions, retaining proper vouchers for all payments made.

2. He shall prepare the pay rolls, or cause them to be prepared, and at the stated times pay salaries and wages due employees.

3. He shall make, or shall have prepared under his direction, all analyses, records and reports of the treasurer's office called for by the superintendent, trustees and officials of the State government.

4. He shall have charge of cash and valuables belonging to patients, and shall keep a suitable record and make proper accounting of these items.

5. He shall examine, check and classify all bills received and make proper record of them, and make timely payment of all discount bills. He shall promptly deposit in an approved bank all moneys received by him, and shall transmit receipts to the Treasurer of the Commonwealth as required by law.

6. He shall direct the work of the bookkeeper, cashier, clerks and any other employees in or connected with his office, and

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shall be responsible to the superintendent for the efficient and orderly conduct of all the business in his department.

7. He shall perform such other duties as may be assigned him by the superintendent or trustees.

Superintendent of Nurses.

Under the general authority of the superintendent of the hospital, the superintendent of nurses shall have supervision of the training school. Her duties shall include such oversight, direction and discipline of the nurses and attendants as may be authorized by the superintendent.

Matron.

1. The matron, under the direction of the superintendent, shall have such control of the domestic or housekeeping affairs of the hospital, outside of the wards, as may be assigned to her.

She shall supervise and direct the employees in her department, and assist in securing faithfulness in the discharge of their duty.

2. Her duties shall include such care of officers' and employees' living quarters, dining rooms and kitchens, and of the administrative offices, halls, corridors, etc., as may be assigned to her.

3. She shall see that all table, bed and other linen of the hospital is properly marked and carefully preserved and used.

4. She shall also perform such other duties as may be assigned to her by the superintendent.

Pharmacist.

1. The pharmacist shall keep the dispensary and pharmaceutical laboratory in perfect order.

He shall issue medicines or other articles only upon the written prescription of a medical officer, which shall be carefully filed.

He shall manufacture all such preparations as can be more economically prepared in the dispensary.

He shall exercise extreme caution with regard to all poisonous preparations, and see that all such have a cautionary label attached, and that the person to whom they are delivered be informed of their nature. In any case where an apparently dangerous or poisonous dose is prescribed he shall not put up

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or give out the same until after he has called the attention of a physician to the matter and received further instructions. No bottles or cups shall be given out without printed or legible labels, giving the name of the patient, and, if necessary, the dose.

2. He shall see that all property belonging to the dispensary is promptly returned thereto.

3. He shall not absent himself from the dispensary, while on duty, without permission, unless necessarily employed elsewhere by direction of the medical officers.

Storekeeper.

1. The storekeeper shall have charge of the general stores, under the immediate direction of the steward.

He shall make an accurate record by weight, count or measure of all supplies received and issued.

He shall not deliver any article from the stores without a requisition properly approved by the superintendent or an officer representing him.

2. He shall file and preserve all orders, notify the steward of supplies needed, keep the storerooms in order, and perform such other duties as may be assigned him by the superintendent or steward.

Engineer.

1. The chief engineer shall have general charge of the heating, lighting and power plant, and of the water supply and sewerage system.

He shall pay strict attention to the proper heating and ventilation of the wards and other hospital buildings, and shall exercise the utmost economy consistent with efficient service in the consumption of coal, water and other supplies.

2. He shall supervise and direct the employees in his department, and report to the superintendent any incompetent or unfaithful service or any misconduct on the part of his subordinates.

3. He shall also keep such records, and make to the superintendent such reports, as may be called for concerning the matters under his charge.

4. He shall inspect, test and keep in good working order all apparatus for fire protection, and shall properly instruct employees in its use.

5. He shall perform such other duties and have supervision of such other work as the superintendent may assign.

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Mechanics.

The persons in charge of and those employed in the various shops of the hospital will be held responsible for all material and work in their various departments, and must, at all times, see that good order and faithfulness are maintained by all employed in the different branches, and that no articles are made and no work undertaken without an order from the proper authority. They must constantly exercise their very best judgment in the care of supplies, and see that no unnecessary waste occurs.

Care should be taken to see that the supplies and rooms are kept in a neat and cleanly condition, and the best of discipline maintained generally.

Under no circumstances must they visit from shop to shop or permit unauthorized persons to visit any of the departments without special permit from the office.

Farmer.

The farmer, gardener and florist shall perform such duties as may be assigned them by the superintendent.

It is the duty of each to have everything committed to his charge attended to in the best possible manner; to see that tools, wagons, implements, carriages, harnesses and stock are kept in good order and repair, and that nothing is lost.

No implements of any kind must be left out over night. A place under cover should be provided for all tools, and employees will be held strictly accountable for any negligence in this respect.

Trespassers will not be allowed on the grounds of the hospital.

Patients are not permitted to go to work, unless under the general direction of an employee of the institution, assigned for that purpose.

The farmer shall keep such records, and make to the superintendent such reports, as may be called for concerning the department under his charge.

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SERVICE MANUAL.[1]

Ward Service and Employees in General.

Conditions of Service.

1. All persons engaging in the service of the hospital are expected to devote themselves entirely to its interests, to regard faithfully its rules and regulations, and cheerfully contribute all their talents to the work of the institution.

2. They shall be of good character and habits, of kind and obliging disposition, and accustomed to exercise a proper self-respect as to personal cleanliness, deportment and dress.

3. Any person desirous of severing his or her connection with the hospital shall give to the superintendent a two weeks' written notice thereof. To the superintendent there is expressly reserved the right to terminate the service of any employee at any time, with or without notice, and for any reason which he may deem sufficient.

4. The following rules and regulations, approved by the trustees, shall be enforced by the officers of the hospital, under the direction of the superintendent.

Superintendent of Nurses.

Under the general authority of the superintendent of the hospital the superintendent of nurses shall have supervision of the training school. Her duties shall include such oversight, direction and discipline of the nurses and attendants as may be authorized by the superintendent.

Supervisors.

1. The nurses and attendants in each division are subject to the authority and directions of the supervisors in charge thereof, who must be recognized as the immediate agents of the super-

[1] Each employee is given one of these manuals for guidance and instruction in the work and duties of his or her position. It must be returned to the business office, together with all keys belonging to the institution, when leaving the service.

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intendent and medical officers in carrying out their instructions and the established rules of the hospital. Their relations and bearing towards nurses and attendants must be independent, uniformly just and impartial, free from all needless severity and harshness, but also free from favoritism or any disposition to overlook or excuse any departure from right conduct.

2. Supervisors, under the direction of the physicians, have the assignment and selection of patients for occupation. New patients must not be employed until the attending physician has passed upon its propriety, and no patient must be allowed to do work, either in quantity or kind, which will injure or overtax him or her. No violent or suicidal patient may have any work or implements with which he or she might do mischief.

3. It is also the duty of supervisors to make the necessary arrangements for patients' attendance at entertainments, chapel services or other gathering, and they must secure as full attendance as possible on all occasions.

4. Supervisors must see that new attendants are properly instructed in their duties, and are made fully acquainted with the rules.

5. The supervisor shall act as a medium of communication between the medical officers and the wards, carrying requests from the nurses and attendants, and directions to the wards, making full reports about the conduct of patients and nurses and carrying out faithfully the orders of the superintendent or the medical officers.

6. Supervisors shall visit the wards under their charge soon after going on duty in the morning, ascertaining the condition of patients and the wards, and making a written report as to the condition of patients and nurses and attendants under their charge to the assistant physician at the hour designated. They shall make such inspection of the food service, dining-room service, clothing, bathing, recreation, etc., as the superintendent or his representative may direct, and shall report any misconduct on the part of employees, any sudden or dangerous changes among the patients, any repairs necessary, at once, to the superintendent or other proper medical officer.

They shall have the welfare of the institution at heart, and shall constantly strive in every way, in matters which are not mentioned in detail, to see that the patients are well and properly cared for, and that the discipline of the institution is at all times maintained.

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Nurses and Attendants.

1. The first object of all nurses and attendants must be the welfare of the patients. The whole future life of many a patient may depend on the manner in which nurses and attendants do their duty. They should therefore receive instruction in the line of their duties attentively, and carefully heed it.

2. They shall treat patients with respect and kindness, and avoid rudeness and violence of every kind. It shall be the duty of any nurse, attendant or employee to report to the superintendent any violation of this provision. Failure to report abuse of a patient makes of the witness an accomplice after the act and a sharer of the guilt. Should it become necessary to use force to protect or restrain violent patients great care must be exercised and sufficient assistance obtained by any nurse or attendant to provide against endangering or injuring the patient, and it shall be the duty of any nurses, attendants or employees to render such assistance.

3. Patients should be requested, and not ordered, to do this or that, and in case of refusal or objection the reasons for the request should be explained. Physical force should not be used to make a patient do as requested; if resistance is apparent the supervisor should be summoned. No patient should ever be threatened with removal to another ward.

4. The delusions or other peculiarities of the patients should never be made the subject of amusement or ridicule. No promises should be made to patients which cannot be carried out.

5. Mechanical restraint shall never be applied to a patient without the written prescription of a medical officer.

Seclusion shall be resorted to in any instance only with the authority of a medical officer, except in great emergencies, and should then be immediately reported to the medical officer in charge. The unauthorized use of restraint or seclusion is forbidden by law, and any person violating the law is subject to prosecution (chapter 589, Acts of 1911).

6. As many attendants as the superintendent may direct must be present with the patients on each ward, and under no circumstances may one absent himself or herself until properly relieved. Nurses and attendants, when on active duty, shall not sit in their rooms nor loiter in the linen rooms, clothes rooms or serving rooms.

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7. Whenever the superintendent or a physician, supervisor or other superior officer, enters the ward, all the nurses and attendants, as a matter of respect and courtesy, shall rise, and the senior nurse present shall accompany him through the wards and be prepared to give all necessary information concerning the patients in his or her charge.

8. Nurses and attendants are expected to set a good example to their patients in language, conduct and dress. They shall encourage their patients to amuse themselves by reading or playing the games provided, but they must not, while on duty, engage in games with patients unless for their encouragement or amusement.

9. The highest standard of housekeeping and hygiene shall be maintained.

10. Nurses and attendants will be held responsible for the cleanliness of the respective wards, but they are permitted and expected to obtain the assistance of patients in every way consistent with their comfort and health. The employment of patients shall not be compulsory, but the benefit of such occupation is rather to be procured for them by kindness and encouragement.

11. Patients on their arrival in any ward, whether coming from other wards or when first admitted, must always receive special care and attention.

12. New patients are not to be employed, or taken out of doors or to entertainments or chapel, until a medical officer has passed upon their fitness therefor. Suicidal patients are to be kept under observation, and not permitted to retire alone to their rooms and close their doors.

13. Nurses and attendants must rise promptly at the time designated, and prepare the patients for breakfast.

14. The services of nurses and attendants shall be continuous during the hours designated for duty. Nurses and attendants must not be absent from their places of employment without permission.

15. Patients' clothing shall be adapted to the season, and special care shall be taken to see that they are adequately and carefully dressed in cold weather. All underclothing shall be changed once weekly at least, and oftener if necessary.

16. Patients must be constantly maintained, as regards person and clothing, in a clean and orderly condition.

17. Each patient must be properly bathed at least once a

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week, and oftener if necessary, unless otherwise ordered by the physician. No patient is allowed to bathe unattended, except by special permission of a medical officer, or to be alone in the bathroom. Be careful to avoid scalding patients in the bath. Tubs must be cleansed after each patient has bathed, and two patients must never be allowed to bathe in the same water.

18. Male patients who do not wear full beards should be shaved at least once a week, and oftener if necessary, and beard, moustaches and hair neatly trimmed. Except by special permission of a medical officer, no patient shall be allowed to shave himself or another patient, and then only with a safety razor and under the supervision of an attendant.

19. The supervisors and nurses will see that the food is properly served and warm, and that no patient is ever deprived of food at the usual hour for meals. When patients are unable to go to the dining room the charge nurse must see that their food is properly served.

20. Patients shall not be put to bed before the time designated by the superintendent. When the patients in any ward have retired, all unnecessary lights are to be turned off. All patients are to be counted at rising time, meal times, bedtime, on going out for work or exercise, and on returning.

21. All suicidal or dangerous patients, and those likely to escape, must be under constant supervision.

The outside doors, window guards, waiter slides, knife drawers in dining rooms, medicine cupboards, linen closets and bathrooms must be kept locked. Medicine poisons, razors and other dangerous articles must not be left in the wards, attendants' rooms or in any other place where they can be reached by patients. Patients are not allowed in attendants' or nurses' rooms except by permission of a physician.

22. Complaint or appearance of sickness or injury is to be reported at once to the proper officer.

When an epileptic has a convulsion let him lie down with a pillow under the head and loosen the collar. Patients should not be left alone when having convulsions. Epileptics should not be allowed to stand on a table, stepladder or any place where they may be injured by falling.

23. When nurses and attendants accompany employed patients, they shall assist and direct them. Every precaution must be taken to avoid injury or accident to patients while at work. They must not be permitted to suffer from extremes of temperature, either heat or cold.

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24. Nurses and attendants shall accompany patients to religious services and entertainments, on which occasions they shall consider themselves as on duty.

25. When nurses or attendants are absent from their duties, except on leave, they will be subject to a deduction from their wages for lost time.

26. Nurses and attendants shall not receive visitors on the ward without permission.

27. Nurses and attendants must treat visitors with civility and politeness, but will be careful to avoid conversation upon the condition or prospects of patients. Visitors must be referred to the physicians for information upon such subjects. Nurses and attendants are also forbidden to visit or hold correspondence with friends of the patients. Letters regarding patients received by them must be referred to the medical officers.

28. Nurses and attendants are forbidden to wear or use articles of clothing, etc., belonging to patients or to the hospital, unless given to them, under the rules for such wear or use.

29. On leaving the premises nurses and attendants will deposit their keys where directed, and call for them in person on their return. The keys of a nurse or attendant shall never be surrendered to another person. They are to be securely attached to the person by a cord or chain and carried in the pocket or on a belt hook. Keys belong to the hospital, and shall always be surrendered at the request of the superintendent.

30. In the event of fire nurses and attendants shall be guided by the special rules governing such emergency.

Do not keep turpentine, oiled rags or other dangerous combustibles in the clothes rooms or anywhere in the ward buildings.

31. Every member of the training school must attend the lectures of the training school, unless for some special reason excused by the superintendent.

32. Attendants and nurses must, at all times, when on duty, wear the prescribed uniform.

Night Nurses and Attendants.

1. Night nurses and attendants shall enter upon and leave their duties at the hours designated by the superintendent. They shall endeavor, during their hours of duty, to minister to the wants of the patients, quietly and without disturbance. They shall exercise special watch over those who are very feeble or suicidal, keeping watch and knowing the condition of

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all the patients under their care at all times, and make a written report in the morning. They shall provide themselves with and wear noiseless shoes or slippers.

2. They shall maintain a careful watch at all times of the ward, being solicitous as regards injury to patients, by themselves or by others, sudden illness or wants, and must conduct themselves in a quiet manner, allowing no slamming of doors, loud talking, etc.

3. In case of serious illness report must be made at once to the proper medical officer, as well as in case of unusual excitement or disturbance. If in doubt the physician should be called.

4. In case of an accident or violence arising, sufficient help must be called to care for the patient without injury or roughness.

5. Night nurses and attendants, and other employees on night duty, are required to be in their rooms during such hours of the day as may be designated, to insure a reasonable amount of rest and sleep to fit them for their responsible duties.

Rules applying to All Other Employees as well as to Attendants and Nurses.

1. No employee shall be absent from the hospital beyond the stated time for which permission has been granted. All employees residing in the hospital buildings must be in their rooms at the designated hour, unless permission is obtained to be longer absent.

2. Intoxication, or bringing intoxicating liquors upon the premises, shall be considered sufficient cause for dismissal from the service of the hospital.

3. No male employee shall enter or carry the keys to those portions of the hospital occupied by women, except by permission of the superintendent.

4. Employees shall not escort their friends or other visitors about the building, or admit them into the wards without permission. Neither shall visitors to those employed in the kitchens, bakery, laundry or sewing room, workshops or other departments, be allowed to loiter or sit about those places.

5. It is expressly forbidden to furnish any patient with any intoxicating drink, or deliver to or receive from a patient any letter, parcel or package without the knowledge and consent of a medical officer.

6. Employees taking patients to employment will be held strictly responsible for their safety, kind care and safe return

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to their respective wards. All employees, in their relations with patients, will be subject to the rules governing nurses and attendants.

7. Patients shall not be employed upon private work without the consent of the superintendent or other officer representing him; and no employee shall be allowed to trade or bargain with the patients.

8. Smoking shall not be permitted within doors anywhere, except at such times and places as may be designated for that purpose.

The use of safety matches only is permitted, and no employee shall carry or keep in his room any other kind.

9. All employees must be ready to perform, temporarily or on holidays, any extra or unusual duty that may be assigned them.

10. Becoming conduct and appearance, absolute cleanliness and order, are to be expected at all times.

11. Employees shall exercise care and prudence in the treatment of property belonging to the hospital, and will be held responsible for property entrusted to their care.

12. Cooking shall be done only in the kitchen and washing only in the laundry, except by special permission of the superintendent.

13. Improper conduct of any kind will not be excused because it is not specifically mentioned and described in these rules.

14. As these rules are furnished to every employee, any ignorance of their requirements will not be accepted as an excuse for their violation.

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